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The A. V. A. Convention

The third annual convention of the AMERICAN VOCATIONAL ASSOCIATION will be held on December 13, 14, and 15, 1928 at Philadelphia, Pa.

This is a real opportunity for industrial-arts teachers to attend an important convention and at the same time visit a city that is very rich in historic interest.

ATTEND the largest and best vocational convention that has yet been held.

VERY many of your fellow teachers will be there. Why not you?

AGAIN—don't forget the convention dates, DECEMBER 13, 14, and 15.

Christmas Cards

Printing and art teachers are invited to send samples of Christmas and New Year's cards that have been produced in their classes, to the INDUSTRIAL-ARTS MAGAZINE.

Let's have a printing supplement, to show what our schools can produce in that line.

(The articles contained in the Magazine are regularly indexed in "The Reader's Guide to Periodical Literature," the "Loyola Educational Index," and "Current Magazine Contents.")

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THE INDUSTRIAL ARTS MAGAZINE

Volume XVII NOVEMBER, 1928 No. 11

MEETING THE NEEDS OF THOSE WHO ATTEND THE VOCATIONAL EVENING SCHOOL

Frank A. Maas, Milwaukee, Wis.

NEVER before in the history of America have adult people clamored so earnestly for the opportunities offered to them by evening schools. The courses offered by these schools must, of course, meet the needs of adult education in their respective communities. Boards of education are setting aside millions of dollars yearly to meet this important demand. It is universally granted that such expenditures are necessary and justifiable, because it is the best method which can be offered employed men and women to better fit themselves for meeting the industrial and economic problems with which we are faced today. It is the returns on their investment that inspired these adult learners to pay out their last dollar for registration fees in a vocational evening school.

THE EVENING SCHOOL INVITES YOU
From the Evening School Bulletin, Shorewood, Wis.

It is difficult to enumerate all of the reasons why people attend evening school, but after one has been connected with evening-school work for a considerable period, he becomes conscious of many of the leading causes that prompt people to attend. Take the case of the elderly, discouraged-looking man who stepped into our office one day. He had been out of work for a long time and was unable to secure work on account of his age and infirmities. He looked over the evening-school bulletin in a dispirited way, remarking "The best thing for me to do, is to go and hang myself." It happened that one of our office girls overheard this remark, and she said to him, "Why don't you learn shoe cobbling? That will give you an opportunity to earn a living and be independent." The old man's eyes brightened and he at once enrolled. Today he is a self-respecting citizen earning a comfortable living at shoe cobbling.

Another man, about 50 years of age, said that he was studying accounting because he had for the past thirty years been connected with a small firm as bookkeeper, shipping clerk, salesman, etc. The company became insolvent and he was forced to look for another job, but he was not well enough equipped to ask for a job in any one of the lines he had been employed. Consequently, he was attending evening school to fit himself for a bookkeeping position.

Mrs. B. studied architecture at the age of 55 because she believed that every woman should know something about house planning. Mr. J. had accepted a job as a draftsman in the city engineer's office. He had obtained the job partly on bluff and now had to make good. He comes to evening school loaded with fresh problems that trouble him during the day. He desires to solve these and to gain additional information. Mrs. M. comes to evening school because her husband is attending and she doesn't want to stay at home alone. Mrs. K. wants to have some Christmas presents made, so she joins an art class.

Mr. N. is going to South America next summer so he is preparing by taking Spanish in an evening class. Mr. C. is a carpenter and comes to learn roof framing, blue-print reading, and estimating. Hundreds of other good reasons for attending vocational evening classes might thus be enumerated.

Whatever the many causes are for the attendance at evening schools, we must acknowledge that the greatest cause of all is the need to adjust oneself to a particular job. A century ago people grew up in their jobs, but in our modern industrial civilization, new jobs are constantly being created to which

people must fit themselves. It is interesting to observe how, in a comparatively few years, labor has shifted due to inventions like the automobile, the airplane, the gas engine, the steam shovel, the concrete mixer, the farm tractor, and the electric motor. Fifty years ago, approximately 90 per cent of Americans lived on farms while today scarcely 40 per cent live on farms. This great shifting of labor implies a proportionate amount of additional training.

Vocational evening schools, to be successful, must meet the needs of their respective communities. Nothing could be more unwise than to attempt to set up an artificial curriculum. To justify the existence of such schools, they must be designed to satisfy specific needs or desires. In order to meet the needs of a community, it is good practice to offer a large variety of subjects and to organize classes in all subjects which have a sufficient enrollment. It is also well to cooperate to the fullest extent in organizing classes in subjects that are not listed, provided a sufficient number of people call for them. The following statement which was clipped from an attractive night-school bulletin illustrates this point.

AT YOUR SERVICE

The preceding pages list the courses to be offered this season. However, it is impossible for the Board of Vocational Education to determine accurately the needs and wishes of the community in our program of adult education. The courses offered this season are the result of previous experience and a study of community needs. We feel that we can still improve in our service to Shorewood, and to that end we ask each resident for suggestions as to courses to be offered. A class can be formed at any time during the school year and efficient instructors engaged at the request of twelve or more interested persons. YOUR COOPERATION IS DESIRED.

If you do not find in this booklet the type of work you wish, make your wants known to us and we shall do our level best to assist you in finding a sufficient number of other interested persons to make the formation of a class and the employment of a teacher practicable.

It might be of interest here to study two vocational evening schools in respect to the subject which they offer in their respective communities. For the sake of contrast, two radically different communities were selected for this comparison. One of the communities is a cosmopolitan city of 500,000 people with a vocational evening-school registration of 12,968 students; the other is a fashionable suburban community with a population of 12,000 people and a vocational evening-school registration of 1,309 students. The population of the latter district consists mostly of professional and business men. It is evident that the demands of these communities are not going to be the same. For the sake of simplicity I have grouped all of the subjects offered in the two districts under six heads: Commercial, Academic, Arts and Crafts, Shop and Laboratory, Music, and Recreation. It is natural to expect that the larger evening-school district will offer the greatest number of subjects, but it is interesting to note that the smaller community offers the widest range of subjects. Following are the subjects offered in these two communitis.

COSMOPOLITAN CITY WITH A POPULATION OF 500,000

Commercial Courses

- Accounting
- Bookkeeping
- Business Procedures
- Calculating Machine Operation
- Commercial English
- Commercial Law
- Economics
- Elliott & Fischer Machine Operation
- Commercial Arithmetic
- Real Estate and Insurance
- Salesmanship
- Stenography
- Typewriting

Academic Courses

- Algebra
- Americanization
- Arithmetic
- Aviation (Theory)
- Automobile and Gas Engines (Theory)
- Auto Electricity (Theory)
- Calculus
- Electricity, A. C. (Theory)
- Electricity, D. C. (Theory)
- English
- Freight Traffic
- Geometry
- Government
- Home Nursing
- Income Tax
- Industrial History
- Meat Marketing
- Mechanics of Materials
- Nursing
- Parliamentary Law
- Personnel Administration
- Public Speaking
- Shop Mathematics
- Spanish
- Strength of Materials

Arts and Crafts and Miscellaneous Courses

- Arts and Crafts
- Beauty Culture
- Clothing
- Foods
- Millinery
- Commercial Art

Music Courses

- Bands
- Glee Club
- Music Apreciation
- Orchestra

Shop and Laboratory Courses

- A. C. Electricity
- Applied Mechanics
- Architectural Drawing
- Armature Winding
- Automobile Mechanics
- Automobile and Gas Engines
- Automobile Electricity
- Barbering
- Blue-Print Reading
- Bricklaying
- Cabinetmaking
- Carpentry
- D. C. Electricity
- Electric Design
- Electric Furnaces
- Electric Machines
- Elementary Hand Composition
- Garment Design
- Industrial Chemistry
- Linotype Operation
- Machine Shop
- Meat Cutting
- Mechanical Drawing
- Painting and Decorating
- Pharmacy
- Plumbing
- Presswork
- Roof Framing
- Sheet Metal
- Shoe Repairing
- Show-Card Writing
- Steam Engineering
- Upholstering
- Watch Repairing
- Welding

URBAN COMMUNITY WITH POPULATION OF 12,000

Commercial Courses

- Accounting
- Bookkeeping
- Commercial Law
- Home Finance
- Office Practice
- Real Estate Law
- Salesmanship
- Shorthand
- Typing

Academic Courses

- Citizenship
- English
- French
- German
- Infant Care and Hygiene
- Parliamentary Law
- Public Speaking
- Spanish

Arts and Crafts and Miscellaneous Courses

- Arts and Crafts
- Art Metal
- Cone Painting
- Cooking
- Dressmaking
- Lamp Shades
- Millinery
- Novelties
- Photography
- Pillows
- Reed Work
- Ship-Model Construction
- Textile and China Painting

Shop and Laboratory Courses

- Drafting
- Landscape Gardening
- Show-Card Lettering
- Woodwork

Music Courses

- Band
- Glee Club
- Ladies' Chorus
- Orchestra
- Piano

Recreational Courses

- Ballroom Dancing
- Fencing
- Lecture Course
- Physical Education

Comparison is made easier by reducing the group registration in the two districts to a percentage basis as was done in Figure 1. As is apparent from the diagram, 28 per cent of the registrations in the larger community were in the commercial department, while only 6.8 per cent of the registrations in the suburban community were registered for commercial work. It is interesting to note that only in arts and crafts and music are the registrations similar in the two communities. The most striking difference appears in the recreational group. This group constitutes 48.3 per cent of the registrations in the smaller community while it is entirely absent in the larger community. The suburban community demands recreation by its mentally fatigued business and professional people, and, consequently, the night-school bulletin lists classes in ballroom dancing, physical education, fencing, and a splendid lecture course.

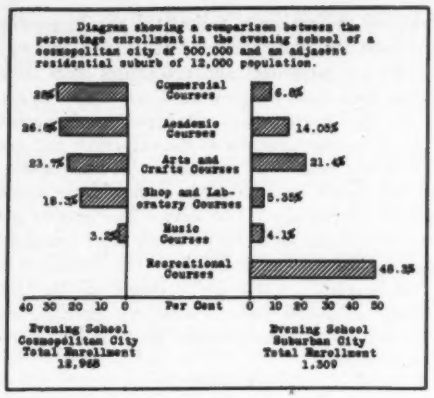


FIG. 1

As has already been stated, the offering of the proper courses is very important, but the selection of teachers who are to take charge of the classes, presents no less difficult problem.

There are many people who desire to teach evening school, primarily for the additional income which it affords them. Of the large number who apply for such positions, only a small percentage are qualified. Too many evening-school teachers treat their work in an insincere way. As a rule, an evening-school teacher's work can be safely evaluated by the way the students stick to the class. If there are many withdrawals from the class, the teacher is not properly teaching the subject. There was, for instance, one teacher who had 76 per cent withdrawals from his class before the course was three fourths completed. There was another teacher who had no withdrawals during the entire year, and 90 per cent of his old students reported back the next year. Although the first man had the better academic training he was a failure as an evening-school teacher. It is a mistake to think that one can teach an evening-school class without specially preparing for every class. Adults will not tolerate a teacher who takes their time to prepare his teaching material. For best results, it is necessary for the teacher to be in his classroom long before the class enters, so that the work can be started properly when the time arrives. It is this first impression of the evening's work that determines the degree of interest that will be developed in the classroom.

THE PATERNAL OCCUPATIONS AND TRADE CHOICES OF VOCATIONAL-SCHOOL APPRENTICES

Max S. Henig, Newark, N. J.

THE very fact that the vocational industrial school is a highly specialized educational institution, in most instances not yet particularly well articulated with the other elements of the educational system, gives importance to any systematic study of the pupils of these schools. Much has been said and written about who should attend them; namely, the motor minded and those for whom further attendance in the academic schools would be profitless; but little has as yet been done to study systematically the characteristics of those who do attend these institutions.

The following is an account of an investigation made at the Irvington unit of the Essex County (N. J.) Vocational Schools to determine, first, the selective quality of the vocational industrial school in terms of the occupations of the fathers of the boys enrolled; and second, the influence of the parents' occupations upon the trade choices of the apprentices.

Underlying the investigation was the desire to discover whether the vocational school was actually attracting boys who otherwise would have gone to high school; and also to what extent the common belief, that the father influenced his son away from the trade he himself was engaged in, held true. The data for this study were obtained by requiring each boy as he enrolled to state the occupation of his father, also, whether he is an employee, the proprietor of an establishment, and similar pertinent facts. All questionable cases were cleared up by conference with the apprentices involved. In order to avoid any doubtful conclusions, the data obtained from those boys whose fathers had died were not used.

This procedure was continued for two years, during which period the desired information was obtained from 403 boys. The results are presented in the following table:

Studies such as this have also been made in both public and private secondary schools and so make interesting comparisons possible. Counts[1] has studied the paternal occupations of students in four public high schools and two private schools, and has drawn therefrom certain conclusions concerning the selective character of these two types of secondary schools. Cole[2] supplemented this study by an inquiry into the parental occupations of 520 boys at the Lawrenceville School.

TABLE I

Occupations of Parents of 403 Vocational Industrial-School Pupils

Parental Occupation	*Number*	*Per Cent*
Proprietor	18	4.5
Professional Service	9	2.2
Managerial Service	37	9.2
Commercial Service	19	4.7
Clerical Service	12	3.0
Artisan Proprietor	29	7.2
Agricultural Service	9	2.2
Manual Labor	219	54.3
Transportation	14	3.5
Personal Service	9	2.2
Government Service	17	4.2
Unclassified	11	2.7
Total	403	99.9

Table II presents the data obtained by the above studies along with the figures secured by the investigation conducted at the vocational school.

TABLE II

Occupations by Percentages of fathers or guardians of 17,625 students in the public high schools of Bridgeport, Mt. Vernon, St. Louis, and Seattle, and 619 students in Phillips Exeter Academy and the University of Chicago High School; of fathers of boys in the Lawrenceville School; and of fathers of boys in the Irvington Vocational School.

Parental Occupation	*High Schools*	*Phillips Exeter and U. of C. High School*	*Lawrence-ville*	*Irvington Voca-tional*
Proprietors	19.8	42.7	52.1	4.5
Professional Service	9.4	31.0	23.1	2.2
Managerial Service	16.5	11.5	10.8	9.2
Commercial Service	9.5	9.0	7.9	4.7
Clerical Service	5.8	2.1	0.8	3.0
Artisan Proprietors	4.2	1.3	0.2	7.2
Agricultural Service	2.4	0.7	1.9	2.2
Manual Labor	29.1	0.3	...	54.3
Unclassified	3.3	1.4	3.2	2.7
Transportation	...	...	...	3.5
Personal Service	...	...	...	2.2
Public	...	...	...	4.2

[1] G. C. Counts, "The Selective Character of American Secondary Education." Supplementary Educational Monographs, No. 19 (University of Chicago, Chicago, Ill., May, 1922).

[2] R. D. Cole, "Parental Occupations and Vocational Choices of Private-School Students." The Journal of Educational Sociology, Volume 1, No. 4, December, 1927.

Table II reveals clearly the distinctly selective character of each of these three types of schools.

Each one draws from a totally different vocational level. This is well illustrated by the figures for the combined proprietor and professional group. The private schools include approximately 75 per cent of the parents of their students in these groups; the high schools, 29.2 per cent; while the vocational school shows only 6.7 per cent. Another indication of this same fact is afforded by the figures for the artisan-proprietor and manual-labor groups, which include 61.5 per cent of the fathers of the vocational-school apprentices, 33.3 per cent of the fathers of the high-school students, and practically none of the fathers of the boys attending private schools. The amount of overlapping is even less, in all probability, than the above figures indicate. The proprietor and professional classes of the parents of the Lawrenceville School pupils, for example, included 40 lawyers, 36 merchants, 30 doctors, 25 bankers, 24 real estate men, 20 engineers, 16 brokers, 15 insurance men, 20 contractors or builders, 9 auto salesmen, 6 publishers, 3 architects, and 4 teachers. The same two classes in the vocational school were represented by the owners of neighborhood butcher shops and confectionery stores, a veterinarian, two druggists, and others of the same standing. Counts has remarked on relatively the same fact in his study:

"The differences between the public high schools and these secondary schools are actually greater than statistics indicate. In all probability there is an important average difference between the managerial service represented in the two types of schools. Fathers engaged in these occupations who send their children to the private school hold positions somewhat superior, as a rule, to those held by fathers similarly classed who send their children to the public schools. Many of those representing the managerial occupations in the high school are foremen, while this grade is practically absent in the private school. The same may be said of each of the remaining occupational groups, when examined in the concrete."

With reference to the occupational level of the fathers of the boys enrolled, the vocational schools are, evidently, highly selective. The fathers of these apprentices are on an occupational level as distinct and apart from the occupational level of the parents of high-school pupils as the latter is distinct from that occupied by the fathers of private secondary-school pupils. In a community where attendance in a vocational school is entirely free from any undue influence or compulsion, in this one respect certainly, the trade school does not infringe upon the high school.

The data obtained concerning the occupations of the fathers of these apprentices also made possible an investigation into the degree of influence that the occupation of the father had upon the trade choice of the son. In making this study, it was possible to consider among the numerous occupations followed by the fathers only those in which instruction was given at the school; namely, auto repair, carpentry, drafting, electricity, machine-shop practice, and printing. Table III shows the number of fathers and sons engaged in each of these occupations.

TABLE III

Fathers and Sons Following the Same Occupation

Trades Taught in Vocational School	*Fathers Engaged in these Trades*	*Sons Selecting Fathers' Trades*	*Per Cent*
Auto Repair	13	6	46
Carpentry	43	8	19
Drafting	1	0	0
Electricity	7	6	86
Machine-Shop Practice	29	3	10
Printing	2	1	50
Total	95	24	

Disregarding at present the drafting and printing trades as presenting too few cases to permit any valid conclusions, it remains evident that, whereas in the case of the auto repair and the electrical trades, the occupation of the father has a considerable amount of influence in the trade choice of the son, quite the contrary condition exists in the case of the carpentry and the machine trades. If the parents have any influence upon the trade choice of their sons, the majority of fathers who are carpenters and machinists seem to be determined that their male progeny shall not follow in their footsteps. In this matter, the auto-repair and electrical-trade groups stand in sharp contrast to the carpenters and machinists.

This whole matter of the degree of relationship of the trade of the father and the trade choice of the son may also be measured statistically. The device that applies is the contingency method developed by Professor Karl Pearson. In this method, relation is expressed by C, the coefficient of mean square contingency. Table IV presents all the data under consideration including those trades—the drafting and printing—in which the number of cases was few and the statistical treatment involved.

TABLE IV

Degree of Relation between Trade of Father and Trade Choice of Sons in Vocational School

	COLUMN	1	2	3	4	5	6	
		AUTO REPAIR	CARPENTRY	DRAFTING	ELECTRICAL	MACHINIST	PRINTING	TOTALS
TRADE CHOICES OF SONS	PRINTING	2	6			7	1	16
	MACHINIST		3			3		6
	ELECTRICAL		5		6	5		16
	DRAFTING	4	8			4		16
	CARPENTRY	1	8	1	1	6		17
	AUTO REPAIR	6	13			4	1	24
	TOTALS	13	43	1	7	29	2	95

COLUMN 1 - $\frac{1}{13}\left(\frac{4}{16}+\frac{16}{16}+\frac{1}{17}+\frac{36}{24}\right)$ = .2160

COLUMN 2 - $\frac{1}{43}\left(\frac{36}{16}+\frac{9}{6}+\frac{25}{16}+\frac{64}{16}+\frac{64}{17}+\frac{169}{24}\right)$ = .4679

COLUMN 3 - $\frac{1}{1}\left(\frac{1}{17}\right)$ = .0588

COLUMN 4 - $\frac{1}{7}\left(\frac{36}{16}+\frac{1}{17}\right)$ = .3298

COLUMN 5 - $\frac{1}{29}\left(\frac{49}{16}+\frac{9}{16}+\frac{25}{16}+\frac{16}{16}+\frac{36}{17}+\frac{16}{24}\right)$ = .3417

COLUMN 6 - $\frac{1}{2}\left(\frac{1}{16}+\frac{1}{24}\right)$ = .0521

P = 1.4663

$$C = \sqrt{\frac{P-1}{P}} = \sqrt{\frac{.4663}{1.4663}}$$

$$C = .56$$

In a sixfold table such as the above, C is practically equal to *r*, the product-moment coefficient of correlation. With C equal to .56, which is accepted as signifying noticeable correlation, it appears, that in general, so far as choice of trades possible in a vocational school is concerned, the son has a marked tendency to follow the occupation of his father.

From this study, certain valid conclusions can be drawn, namely: (1) that the vocational industrial school does not attract to itself, except in a few cases, those boys whose parents would either desire or be financially able to send them to high school; (2) that in certain trades, there is a strong movement of the son away from the occupation of the father, but that this is offset by a contrary condition in other trades; but, (3) considering all the trades represented in this study, there is a marked tendency of the son to begin by following the trade of the father.

ANALYSIS OF INDUSTRIAL ART

Leon L. Winslow, Secretary, Federated Council on Art Education, and Director of Art Education, Baltimore, Md.

A KNOWLEDGE of art is essential (1) to our intellectual life, because pictures, buildings, statues, and even the common things of daily use take on a new significance when their artistic meaning is understood; (2) to our social life, because most well-informed people are today discussing art matters; (3) to our industrial life, because quality in most manufactured products is determined largely by the element of art that enters into their design; and (4) to our business life, because the art quality in advertising and in the arrangement of goods for display is an important factor in promoting sales.

Consequently, there is a definite and growing need for systematic instruction in art in the schools, due quite generally to the fact that the principles underlying art expression are almost universal in their application. In many of the common activities of life, art plays an important part; its principles are used extensively in the selection and wearing of clothing, in the furnishing of homes, and in the practical work of the trades and professions. Aside, however, from the utilization of art in meeting the ordinary everyday needs and the employment of art principles in the construction of any worth-while industrial product, there remains also to be considered the cultural and re-creational value of art. This is evinced in the enjoyment of all fine and beautiful things fashioned by the hands of man.

In the junior high schools of Baltimore, Md., the subject of art is required of all pupils throughout the entire three years. Instruction has been organized around five major topics as follows: Architecture, sculpture, painting, industrial art, and commercial art. Approximately half of the pupil's time in the art class is given to recitation, illustrated lecture, and textbook assignment, and half to practice in drawing and design.

In its application to instruction in the junior high school, *art* has been defined as the purposeful and creative expression of feeling or of emotion, in appropriate concrete form, with skill in design and technic as factors determining excellence. The five organization topics have also been defined:

Architecture as the art of building, which seeks to harmonize the requirements of use and beauty.

Sculpture as the art of glyptic expression embracing statues and decorative ornament, in which ideas are given solid form in plastic or in hard material by modeling, carving, or casting.

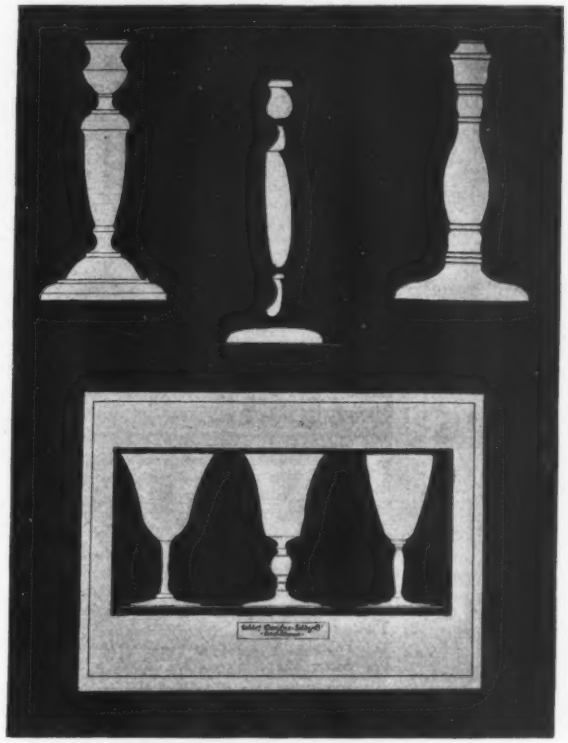
Painting as the art of graphic expression in which objects seen or imagined are represented and in which ideas and feelings are given form by laying colors on a surface.

Industrial art as the art of manufacture in which skill and creative ability are employed in the conceiving or forming of a product of utility in accordance with the principles of design.

Commercial art as the art made use of in business to popularize ideas and products and to give aesthetic pleasure by means of lettering, pictures, and the display of goods in accordance with the principles of design.

With appreciation as the chief aim of the art course, each organization topic is carefully studied under the following subtopics: definition; function; creative expression; form; quality; evolution; and vocational opportunities. Handwork consists of drawing, painting, modeling, and construction or craftswork; it is governed almost completely by the organization topic and is also controlled to some extent by the subtopic relating to *form*. Art form is stressed throughout the three years of the course. It is conceived of as including the entire formation of a work of art in accordance with aesthetic principles; it embraces all art structure which makes use of line as the measure of length, mass as the measure of area, and color as the measure of light. Form is also interpreted to include design, mediums and materials, and processes.

The following outline is intended to serve as a basis for instruction in industrial art in junior- and senior-high-school departments and it may also be used to advantage in the special art school. The outline was prepared under the direction of the author by a class of normal art students working at the Maryland Institute located in Baltimore, Md.



INDUSTRIAL ART

I. *The Industrial-Art Field.*

Industrial art is the art of manufacture in which skill and creative ability are employed either in the conceiving or in the forming of a product of utility in accordance with the principles of design.

A. Kinds of industrial-art products.
  1. Fabric products.
    a) Felt.
    b) Textile.
      (1) Woven pattern, with variation in weave or color, or in both.
      (2) Printed pattern, machine printed or hand blocked.
      (3) Dyed pattern, tie dyed or batiked.
      (4) With applique decoration.
      (5) With embroidered decoration.
      (6) With drawn-work decoration.
    c) Net.
      (1) Lace.
      (2) Crochet.
      (3) Knit.
    d) Costume.
      (1) Dressmaking.
        (a) Blouses.
        (b) Dresses.
        (c) Cloaks.
        (d) Suits.
        (e) Furs.

(2) Millinery.
(a) Hats.
(3) Decorative accessories.

2. Metal Products.
a) Gold and Platinum.
(1) Jewelry.
(2) Watch cases.
b) Silver.
(1) Flat ware.
(2) Hollow ware.
c) Copper, brass, and bronze.
(1) Builders' hardware.
(2) Lighting fixtures.
(3) Grill work.
(4) Balustrades, fences, and gates.
(5) Musical instruments.
d) Pewter.
(1) Flat ware.
(2) Hollow ware.
e) Iron and steel, including building steel.
(1) Builders' hardware.
(2) Lighting fixtures.
(3) Grill work.
(4) Balustrades, fences, and gates.
(5) Automobiles, locomotives, and other machines and their accessories.
(6) Tools.
(7) Armor.

3. Glass Products.
a) Colorless.
(1) Blown.
(2) Pressed.
(3) Cast.
(4) Cut.
(5) Flashed.
(6) Etched.
(7) Sand-blasted.
b) Colored.
(1) Blown.
(2) Pressed.
(3) Cast.
(4) Cut.
(5) Flashed.
(6) Etched.
(7) Sand-blasted.

4. Ceramic Products.
a) Pottery, glazed and unglazed.
(1) Once-fired ware.
(a) Stoneware.
(b) Porcelain.
(2) Twice-fired.
(a) Faience, with opaque glaze, including terra cotta.
(b) Majolica, with opaque glaze.
(c) China, with transparent glaze.
(d) Belleek, with transparent glaze.
(3) Applied for metal, as for sanitary ware.

5. Wood products.
a) Furniture.
(1) Stools, chairs, benches, and davenports.
(2) Sofas and beds.
(3) Chests and other boxes.
(a) Clock cases.
(4) Tables and desks.
(5) Sideboards, bookcases, and other cabinets.
b) Millwork.
c) Vehicles.
(1) Carriages and sleighs.
(2) Railway cars.
d) Boats.
e) Toys.
f) Musical instruments.
g) Athletic equipment.

6. Paper products.
a) Wall paper.
b) Printing and publishing.
(1) Hand plate prints.
(2) Mechanical plate prints.
(3) Newspapers.
(4) Magazines.
(5) Books.
c) Photographs.

7. Bone, ivory, and vegetable ivory.
a) Novelties.
b) Buttons.
c) Handles.

8. Leather products.
a) Shoes.
b) Gloves.
c) Bags.
d) Bindings for books.
e) Straps, harnesses, and belts.
f) Coats and millinery.
g) Sporting goods.

9. Products from synthetic materials.
a) Pyrolin products.
b) Bakelite products.
c) Leatherette products.

II. *The Function of Industrial Art.*
The purpose served by industrial art.
A. Individualistic.
1. Gratification of the impulse to create decorative industrial products.
2. Gratification of the impulse to enhance the beauty of useful things by means of decorative construction and of decoration.
B. Socialistic.
1. Ministers to the material needs of man by lightening his labor and adding to his comfort.
2. Ministers to man's spiritual needs by making beauty a factor incorporating in all useful things.

III. *Creative Expression in Industrial Art.*
That which is present in a product of industrial art as indicative of thought and feeling.
A. Inspiration or the impulse to create.
1. To meet material and spiritual needs.
a) Originality.
b) Indebtedness to historic examples.
c) Indebtedness to nature.
B. Imagination or fancy.
1. In construction.
2. In shape and ornamentation.
C. Personality.
1. Individuality in expression.
D. Feeling and emotion.
E. Technic.
1. Suitability of shape to purpose to be served.
2. Appropriateness of materials to purpose.
3. Disposition of the materials.
4. Fitness of decoration to purpose.
5. Fitness of decoration to material.

IV. *Form in Industrial Art.*
The entire formation of a work of industrial art in accordance with the principles of design.
A. Structure.
1. By making use of his knowledge of mass the craftsman-designer determines the size and proportion of a work of industrial art.
2. The craftsman-designer makes use of his knowledge of line in determining the contour and grace of a work of industrial art.
3. By making use of his knowledge of color the craftsman-designer determines the attractiveness of a work of industrial art in respect to light. Many industrial materials are beautiful in color and need only to be finished. All colors that can be produced in dyes, paints and lacquers may be used in the coloring of fabrics and of products of wood, paper, and metal. The surface of metals and woods can also be treated with chemicals to produce beautiful color effects. Metals are also colored by means of heat. Precious stones are naturally beautiful in color. They, as well as glass, are often colored by means of metal oxides which form a part of their chemical composition. The decorative value of an industrial-art product is increased by a skillful choice of natural-colored material or by an application of a colored finish to the surface of the product The finish must always be appropriate to the material.
B. The craftsman-designer makes use of the principles of design in forming an industrial-art product.
1. He forms beautiful products by observing the principle of rhythm in his use of line, mass, and color.
2. He forms beautiful products by observing the principle of balance in his use of line, mass, and color.
C. The craftsman-designer selects materials which are appropriate to the purpose to be served by the product.
D. The craftsman-designer selects materials which are appropriate to the processes of manufacture. For example, carding, spinning, weaving, dying, and printing are important textile processes. Other important industrial processes include smelting, refining, rolling, and casting, for metals; cutting, sawmilling, turning, carving and finishing, for woods; blowing, casting, cutting, and etching, for glass; and pugging, throwing, slip pouring, and glazing, for ceramics.

V. *Quality in Industrial Art.*
That which determines the degree of excellence in a work of industrial art.
A. Quality in materials is dependent on:
1. Beauty, which includes color and texture.
2. Workability, which is conditioned by hardness, malleability, ductility, and other characteristics.
3. Durability, which implies strength and power to resist wear.
B. Quality in form is dependent on:
1. Degree in which the product is actually fitted to meet the purpose for which it was intended.
2. Degree in which the product appears to be fitted to meet the purpose for which it was intended.
3. Degree of beauty of construction and of finish.
4. Degree in which the product possesses decorative value, considered in respect to its intended surroundings.

VI. *Evolution of Industrial Art.*
The origin and development of industrial art.
A. Industrial art had its beginning with man's first attempts to provide beautiful tools, weapons, utensils, and articles of personal adornment.
B. Industrial art has developed under various peoples during various periods of time, each nation making some definite contribution to its advancement. In this evolution, architecture, sculpture, painting, and industrial art have been closely allied.
1. In prehistoric times man first learned to fashion implements from stone. These he strove ever to make more beautiful by refining their shape and by polishing the surface of the material. He learned to make beautiful vessels of clay and to harden the clay by means of fire. These he made still more beautiful by means of decoration. He also learned to make beautiful useful things first, from bronze and, later, from iron.
2. The ancient Egyptians made beautiful articles of furniture, jewelry, and fine linen.
3. The people of Chaldea and Assyria excelled in the making of brick and glazed terra cotta.
4. The ancient Phoenecians were the earliest people to make beautiful glass.
5. The Greeks produced beautiful articles of pottery, of perfect proportion, and with appropriate painted decoration. They also produced beautiful metal objects.
6. The Etruseans and the Romans produced beautiful metal products somewhat similar to those produced by the Greeks, though not so fine in design.
7. During the Middle Ages the Christian monks, both in the East and in the West, produced beautiful illuminated manuscripts, and book bindings in which gold and silver and precious stones were sometimes used.
8. During the Renaissance the best examples were intimately associated with the adornment of churches and other buildings, an adjunct of architecture. Small objects at this time were for the most part either neglected or over ornamented.
9. Since the Industrial Revolution, which began about 1800, industrial art has flourished in France, Germany, Italy, England, and Switzerland. France is the present center of costume design. Germany is noted for toys, Italy for fine glass, England for chinaware, Switzerland for watches.
10. The earliest industrial-art practice by the colonists in America was characterized by the classic simplicity which was so well expressed in the colonial architecture of the period. Since the Industrial Revolution, the United States has developed beyond other countries the mass production method of manufacture and is successfully competing with foreign countries in the production of china, glass, costumes, jewelry, furniture, and especially automobiles and machines.

VII. *Vocational Opportunities in Industrial Art.*
A. Desirability of industrial art as an occupation.
1. The craftsman-designer or industrial artist produces, or plans for factory production, objects to meet the material along with the intellectual needs of man in respect to a large number of products including fabrics, garments, jewelry, rugs, curtains, furniture, utensils and tools, machines, vehicles, books, magazines, and prints. He therefore contributes much to the physical comfort and the spiritual enjoyment of life.
B. Main advantages and disadvantages of industrial art as an occupational field.
1. The work of a craftsman or designer is most interesting because it constantly involves the adapting of materials to a specific purpose to be served. It also frequently involves the adaptation of historic forms and of naturalistic motifs.
2. The work of an industrial artist is sometimes trying and exacting but the occupation may be generally regarded as healthful, although precautions have to be taken in instances where poisonous or otherwise injurious chemicals are used in forming a product or a model for machine manufacture.
3. There is a demand for imaginative and skilled craftsmen and designers in the industrial-art trades, especially in the fields of textiles, costumes, jewelry, silverware, furniture, wall paper, ceramics, and printing.
4. Once a craftsman-designer has been admitted to an industrial establishment, he is quite certain of steady employment provided that he is possessed of good taste and continues to grow in adapting himself to the new conditions.
5. The employed craftsman or designer observes the usual working hours. If he is the only person in his department all jobs fall to him. If he has assistants he either delegates to each, certain design problems in their entirety, or else he has each assistant develop a certain part of the design. Each separate art has its individual problems and processes to be taken under consideration.
6. Employed industrial artists often observe the same vacations that are given to other salaried workers. Sometimes they are given time off in the dull season.
7. The craftsman or designer entering an industrial establishment is paid a small salary, perhaps $1200 a year. Later he may receive from $3000 to $5000 and in rare instances even more. In a number of industrial-art establishments in the United States the designers have come to be stock holders, responsible administrative officers, and even presidents of their concerns.
C. Requirements for success:
1. In order to become a successful industrial artist an individual must possess:
a) Artistic taste, and a knowledge of the principles of design.
b) Capacity to understand structure and construction.
c) Capacity to understand industrial materials and the technical processes involved in machine manufacture.
d) Knowledge of decoration.
e) Creative imagination.
2. In order to become a successful industrial artist an individual must have a broad educational background including:
a) A good high-school course with a maximum amount of artwork in the form of theory and practice courses in design, crafts, and modeling, and in the history of art.
b) A good art-school course in design and craftsmanship.
D. The masters of industrial art.
1. Douris (438 B.C.) was a Greek craftsman, who made and decorated vases.
2. Luca Della Robbia (1400-1482) of Florence, Italy, produced enameled terra cotta which was used extensively for decorative purposes.
3. Peter Vischer (1455-1520) of Nuremberg, Germany, produced beautiful products in bronze and other metals.
4. Bonvenuto Cellini (1500-1572) was a goldsmith of the Italian Renaissance.
5. Antonio Stradivari (1644-1737) was an Italian violin maker. Several of his violins are still in use.
6. Johannes Gutenberg (1400-1468) of Mainz, Germany, the inventor of movable type, was a master of the printer's art.
7. Bernard Palissy (1510-1589) was a French potter who brought enamels and glazes to a high state of perfection.
8. Josiah Wedgwood (1730-1795) was an English potter who produced beautiful pottery in which clays of contrasting colors were used in producing decorative effects in relief.
9. Thomas Sheraton (1800) was an English cabinetmaker who produced beautiful chairs, tables, and other articles of furniture. It was he who invented the sideboard.
10. Paul Revere (1735-1818) was a distinguished American craftsman who produced beautiful silverware.
11. Duncan Phyfe (1802) was the first master cabinetmaker of America.

A recent investigation of the junior high schools of Baltimore to discover aptitude and talent in the arts disclosed 109 pupils out of approximately 15,000 with marked ability in art as follows: In architectural, 17; in sculpture, 8; in painting, 29; in industrial art, 30; in commercial art, 33. Of the total

number, 68 of the pupils are girls and 41 are boys. It is hoped that some special provision can be made for this group in one of the junior high schools during the next scholastic year.

In the first year of senior high school, a required general course called "Principles and Practice of Design" is offered, the chief aim of which is the appreciation of art through understanding and applying design principles in the many aesthetic problems of daily life. Performance is given an important place in the outline, the theory being applied directly in carefully executed drawings and designs. In addition to offering this course, most of the senior high schools of Baltimore also make provision for a number of elective art courses which, though cultural in aim, are planned to meet the distinct prevocational needs of groups of advanced pupils whose interests lie in a somewhat restricted field. The courses include commercial art, costume design, color, crafts, free-hand perspective drawing, the history of art, illustration, industrial design, architectural drawing, and interior decoration. Approximately 1,200 pupils were registered in these courses during 1925-26.

The need is now most urgent not only in Baltimore but in many other cities for establishing a sequence of courses, with art as the major subject, leading to a high-school diploma. Graduation from such a sequence should admit either to college or to the vocational-art school.

THE SCHOOL NEWSPAPER

R. A. Loomis, Wm. L. Dickinson High School, Jersey City, N. J.

PUBLISHING a school newspaper provides an extracurricular activity that possesses great educational value. It helps both the school and those who take part in its production. Pupils who are naturally attracted to this work, and have special talent for it, are more interested and work better than those upon whom the work has to be imposed. The school newspaper attracts intellectually inclined students. They recognize it as an outlet for the expression of their own special abilities and ambitions. It is interesting to two classes of pupils, those who like to write and those who are interested in advertising, circulation, and the business phases which enter into the publishing of a paper.

After the staff of the school paper has been appointed, they are put to work under the guidance of a member of the faculty. This teacher-leader may or may not have had previous newspaper experience, but he must have inherited or developed a nose for news and the ability to quickly decide upon the proper arrangement under which the story should be presented to the public by means of printer's ink on paper. With a sufficient amount of this infection in the older assistant, the contagion of the news germ will spread to those who are susceptible to it.

After the call for staff members has been answered, they are given an opportunity to express their preferences. After the various offices have been filled, reporters are appointed to cover all of the activities of the school outside of athletics. Every club in the school is given a reporter. In some high schools there are as many as thirty of these clubs. Then the

THE NEWSPAPER AND ITS EDITORS

principal, vice-principal, and office assistants are to be interviewed and the teachers are divided into groups to be interviewed by voluntary reporters. The superintendent and his assistants receive special attention by the editor-in-chief, or a seasoned reporter is appointed to this job.

It will be found that the number of assignments possible is almost limitless. Descriptions of studies, class elections and activities, debates, special trips to other cities, musical clubs and their meetings, choral societies, dances, class activities, happenings coming to and from school, experiences of pupils and teachers when on vacations or trips, excursions to the country, what graduates expect to do, what those who have graduated are doing—all are sources of news for the student reporter. Besides this type of copy there are the athletic news and the editorials. Sports form an interesting part of all modern newspapers and they are an equally interesting part of the school paper. More discussion is held over what is going to happen or what has happened in a football or basketball game than over the reasons for the real outcome of a Grecian war in ancient history. Let the boy or girl who knows how to play a game, report that kind of game—let it be prepared in the language of the sport—a reporter always pops up who can do the job.

The school newspaper is also an outlet for the nervous energy of the struggling young artist or cartoonist. It is a place where he may display his productions before eyes that have not yet been developed to be supercritical. The lover of the camera may also submit his snapshots and have them published.

In the editorial department of the school paper, a guided discussion of school conditions may be permitted. This should be confined to remarks pertaining to commendable conditions or to new developments that are being made or to suggestions for needed improvements. Care should be taken that this material does not create wrong impressions among outsiders who may read the paper. The discussion of what the older graduates are doing and how the educational knowledge obtained at school has helped them in their present positions, is always a sound and acceptable topic.

In the preparation of copy for the school paper, it is only natural that some students should be superior to others. These should be properly rewarded when the time for promotion appears. The editor-in-chief of the school paper should be one who has risen to the top through his ability. He should be one who can show in his own work that he excels. He should be one who possesses the ability to write the best and most news, and to suggest new assignments. He should be popular in school and be prominent not only in his classwork but also in extracurricular work. He should be willing to see the job through.

Even though the newspaper is primarily the medium to dispense news, it cannot be maintained by the money collected through subscribers alone. The school paper, like the city daily, needs pushing. This provides the work for the members of the circulation and advertising staffs. There are many ways for obtaining subscribers for the school paper. The method that we have tried out is to obtain our subscribers for each individual issue. About a week before the paper comes off the press, subscription blanks are distributed to classroom representatives in every assembly class in school. There are about 200 such classes which are attended by about 3,800 pupils. On the day set for the return of the lists, these representatives bring to the circulation manager not only a list of the names who want the paper but also the 5 cents for each copy ordered. A minimum of 50 per cent of subscribers is expected from each room. Those rooms that fall below the standard are canvassed by a special member of the staff to whom the "low rooms" have been assigned. We have found that our circulation is much larger by this means of collection than when a subscription price for the entire term is asked for at once. It is easier to pay 5 cents per paper than to pay 50 cents at one time. The Dickinsonian is subscribed for by about 75 per cent of the students who attend this school.

The business of promoting the circulation of the school paper may not be as conspicuous as the reporter's job, but it is a very necessary work, and those who take care of it must be impressed with the feeling of importance that it deserves. The practice of collecting and checking up on the money and using it to pay the bills which arise in the printing of the paper, is valuable business training for the young students. The circulation staff always has a full membership. Its activities, of course, must be closely supervised by the faculty member of the editorial staff.

While the money derived from subscriptions may be sufficient to finance the paper, nevertheless there may be advertisers who deem it profitable to advertise in the school newspaper. The pupils who solicit this advertising must be well coached before they are allowed to approach their customers. There must be no gratis advertising. The business man must be shown that his ad produces more business in his store. If it does not, it should not be accepted. The solicitor of advertising for the school paper is in competition with the representatives of other publications. The advertising accepted should have a special appeal for pupils and it should be so written as to sell them the goods. The price should be such that the advertiser feels that he is buying business and not giving a donation. Advertising in the Dickinsonian costs more than advertising in the local newspaper.

Besides the pleasure and broadening influence which work on the school paper gives to those who are engaged upon it, they also obtain the benefit of coming in touch with a practical activity that opens up great possibilities for their own future. As the editor of the New York Times said in an address to student editors "After the smell of printer's ink had penetrated my nostrils and after I had felt the thrill of the news 'beat,' I could see my way clearly. I was only switched off once when I was appointed commissioner of education of the leading state of the Union, but now, as editor of the New York Times, I feel that I have really arrived." Nearly all modern editors of note, were inspired or influenced in adopting newspaper work by services rendered on some school paper or college annual. As a boy, the editor of the United States Daily was in charge of a school paper in Buffalo.

The Dickinsonian, too, has wielded permanent influence over those who have been leaders in its production. It has not only helped its editors but also those who do the printing and solicit subscriptions.

The paper is in existence only five years, yet its first editor is now an advertising man on a local daily. The second is now in college and has there continued his work on the college paper so that his chance of becoming editor of the college annual, an $8,000 publication, is very good. The third is now a normal-school student, and although she expects to be a teacher, she finds time to be editor of the newspaper printed at her school. The fourth served his term (it is customary to allow each editor to hold this important position for but one term, so that more students may be given an opportunity of getting this experience) so efficiently that he was elected to take charge of the production of the senior classbook. After graduation he expects to take a course in journalism in college. The business manager of our paper also intends to attend a college of journalism with the intention of thoroughly learning all about the business of producing a newspaper.

The school newspaper is of interest not only to the pupils and teachers in the school but also to the parents and to the public at large. Many of the pupils treasure each issue, and file it away for the future. The files of the school paper contain the history of the school and as such are valuable for future reference. The paper also establishes a valuable con-

necting link with other institutions with which it is linked through its exchanges.

The benefits of the school paper are well established and recognized. To the student it is an outlet for special talents and offers valuable guidance for the selection of a life's work. It makes the school life more complete. School authorities, teachers, pupils, friends, and parents are more closely united because of the school paper. It is a medium which transmits pleasure and information and presents to all a mirror of the internal life of the school.

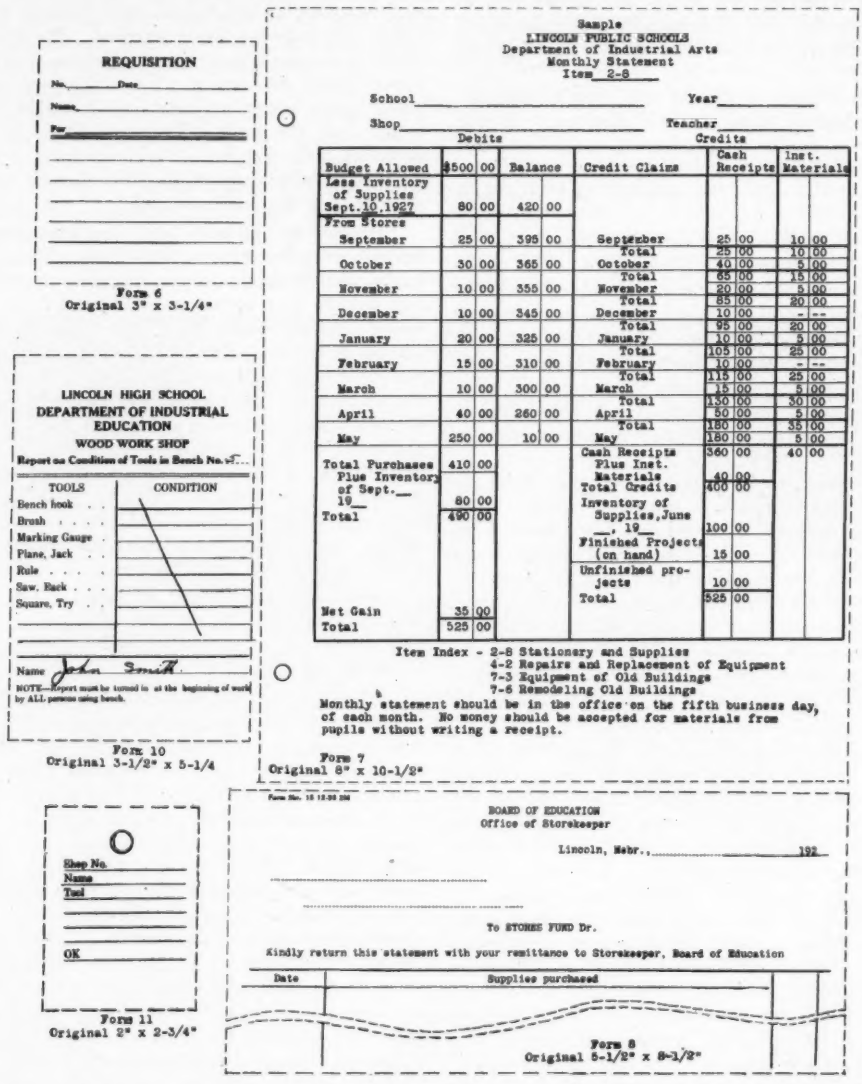
AN ACCOUNTING SYSTEM FOR SCHOOL SHOPS

James A. Hoskins, Lincoln, Nebraska

IN every school shop there is the problem of keeping accounts and making reports to the supervisor or to the school board. These reports must be accurate and yet not occupy too much of the instructor's time. For this reason time-saving account forms are necessary. In our school shop we have a dual set of accounts and reports: those for the things the boys make for themselves and those for school maintenance work. These two types of accounts are kept separate by using white paper forms for the boys and colored paper forms for the school jobs. A specific color has been assigned to each shop in our school. This simplifies posting.

The accounting for the maintenance work may look complicated but it is really very simple, and leaves no chance for disagreement. Any teacher who wishes to have an article made, secures an order from the secretary through the principal of the building or through the supervisor. This order, which is shown in Form 1, is given to the shop instructor who is to make the article. The order gives this instructor the authority to order all materials that may be required for the job. It also gives directions where the job is to be delivered when it is finished, and to what account it is to be charged.

About a week before a table or other piece of equipment



REQUISITION

No. Date

Name

For

Form 6
Original 3" x 3-1/4"

LINCOLN HIGH SCHOOL
DEPARTMENT OF INDUSTRIAL EDUCATION
WOOD WORK SHOP

Report on Condition of Tools in Bench No. ...

TOOLS	CONDITION
Bench hook	
Brush	
Marking Gauge	
Plane, Jack	
Rule	
Saw, Rack	
Square, Try	

Name John Smith

NOTE—Report must be turned in at the beginning of work by ALL persons using bench.

Form 10
Original 3-1/2" x 5-1/4

Sample
LINCOLN PUBLIC SCHOOLS
Department of Industrial Arts
Monthly Statement
Item 2-8

School Year

Shop Teacher

	Debits		Credits			
Budget Allowed	$500 00	Balance	Credit Claims	Cash Receipts	Inst. Materials	
Less Inventory of Supplies Sept.10,1927	80 00	420 00				
From Stores						
September	25 00	395 00	September	25 00	10 00	
			Total	25 00	10 00	
October	30 00	365 00	October	40 00	5 00	
			Total	65 00	15 00	
November	10 00	355 00	November	20 00	5 00	
			Total	85 00	20 00	
December	10 00	345 00	December	10 00	- --	
			Total	95 00	20 00	
January	20 00	325 00	January	10 00	5 00	
			Total	105 00	25 00	
February	15 00	310 00	February	10 00	- --	
			Total	115 00	25 00	
March	10 00	300 00	March	15 00	5 00	
			Total	130 00	30 00	
April	40 00	260 00	April	50 00	5 00	
			Total	180 00	35 00	
May	250 00	10 00	May	180 00	5 00	
Total Purchases	410 00		Cash Receipts	360 00	40 00	
Plus Inventory of Sept.__ 19__	80 00		Plus Inst. Materials	40 00		
Total	490 00		Total Credits	400 00		
			Inventory of Supplies, June __, 19__	100 00		
			Finished Projects (on hand)	15 00		
			Unfinished projects	10 00		
Net Gain	35 00		Total	525 00		
Total	525 00					

Item Index - 2-8 Stationery and Supplies
4-2 Repairs and Replacement of Equipment
7-3 Equipment of Old Buildings
7-6 Remodeling Old Buildings

Monthly statement should be in the office on the fifth business day, of each month. No money should be accepted for materials from pupils without writing a receipt.

Form 7
Original 8" x 10-1/2"

Shop No.

Name

Tool

OK

Form 11
Original 2" x 2-3/4"

BOARD OF EDUCATION
Office of Storekeeper

Lincoln, Nebr., 192

To STORES FUND Dr.

Kindly return this statement with your remittance to Storekeeper, Board of Education

Date	Supplies purchased		

Form 8
Original 5-1/2" x 8-1/2"

is to be built, material therefor is ordered on Form 2 which is in quadruplicate, giving number of job, and budget number for requisitioning supplies. The blue, yellow, and pink sheets are sent to the supervisor, who sends them on to the storekeeper. The white sheet is kept as a record, in the meantime. When the supplies are delivered, the blue sheet comes back to the instructor with the prices marked upon it. These prices he then copies on his white sheet. After he has signed

Form Soc'y 3 10-27 5M Multi.

BOARD OF EDUCATION

JOB SHEET

Operation and Maintenance Department

Original Job Sheet No. 151

Date _____

Instructions covering job

W.F. Secretary

COST

Labor $

Material $

Total $

Date completed_____

Remarks: _____

I certify that the report shown on this sheet is correct_____

Chief Engineer

Form 1
Original 8" x 9"

Form Ser. 13—6-27—1575

QUADRUPLICATE

LINCOLN PUBLIC SCHOOLS

Requisition for Supplies

Filled by.....

No. of pkgs.....

Date.....192..

.....School

Item.....$.....

Amt. Asked	Amt. Sent	Cat. No.	SUPPLIES DESIRED	Cost	Amt. Asked	Amt. Sent	Cat. No.	SUPPLIES DESIRED	Cost

Requisitioned by | Approved by | Recd. by

Audited / Secretary | Correct / Chairman of Committee | Approved by / Member of Board

Allowed

General Fund, Warrant No. A..... $.....

Building Fund, Warrant No. A..... $.....

Special Bond Fund, Warrant No. A..... $.....

Total, $.....

Date Received.....

STATE OF NEBRASKA, LANCASTER COUNTY, ss.

I the undersigned.....do of my own knowledge solemnly swear that the foregoing is a just, true and complete statement of my account or the account of the STORES FUND against the School District of the City of Lincoln, Nebraska, with all just credits allowed and the same is now due and unpaid.

.....

Subscribed and sworn to before me this.....day of.....19.....

.....
Notary Public

(Receipt here in ink)

Form 2
Original 11-7/8" x 13-3/8"

Date_____

Supplies for

Industrial Arts Department

Tools (T) Salable Supplies (SS)
Shop Supplies (S)

Purchased from

(Date purchased)	(Article)	(Price)

Teacher_____

Building_____

Form 3
Original 8" x 10-1/2"

STOCK BILL

INDUSTRIAL ARTS DEPT. LINCOLN HIGH SCHOOL

Name .....

Article .....

Date .....

No. Pieces	Thickness	Width	Length	DESCRIPTION	Material	No. Bd. Ft.	Cost Bd. Ft.	Total

HARDWARE, FINISH, ETC.

TOTAL

Form 4
Original Card 4" x 6"

DEPARTMENT OF INDUSTRIAL ARTS, LINCOLN HIGH SCHOOL

Project Record

Name reserved				Instructor	Locker	Tool No.	Hour

Project	Grade	Price	Price total	Deposit	To Trans.	Refund

Form 5
Original Card 4" x 6"

the blue sheet, he returns it to the storekeeper, who in turn sends it on to the board in order to show that the instructor has received the material, and that the store is to be given credit for the material. The yellow sheet is retained by the storekeeper for his records, and the pink sheet is sent to the supervisor for his files. While this method was designed for a large system, yet it may be adapted to fit any size school deal of time at the end of the semester or of the year. When the article has been completed, the order is so marked and returned to the secretary. This acts as a notification to him to have the equipment delivered to its destination in the school system.

In the case of articles that are made by the boys for themselves, the material is ordered on Form 2. A stock of

FORM SECRETARY 3—11-27—10,000
BOARD OF EDUCATION—APPROVED 3-8-27
MARTIN & COLE ACCOUNTANTS—APPROVED 11-9-27

ORIGINAL

Board of Education No. 76076

SCHOOL DISTRICT OF THE CITY OF LINCOLN
SECRETARY'S OFFICE
LINCOLN, NEBRASKA

Order for Acceptance of Proposal, Equipment, Material, Service, Supplies, Text Books, Etc.
NOT CARRIED IN STORES DEPARTMENT

.....19.....

Acceptance of Your Proposal.....19..... See Description.....
Please Ship by.....To the Board of Education, Care of Storekeeper
Indicate Express, Freight, or Parcel Post.
Please Furnish .....To.....At the ..... { School / Office
Located at .....Streets, Lincoln, Nebr., and charge to the account of
The Board of Education, the following.....

QUANTITY	Style or Number	DESCRIPTION	Unit Price	TOTAL

Terms—Merchandise.
Lincoln orders—2% ten days from first of following month.
Other orders—2% ten days from date of invoice.

DIRECTIONS—
1. Bill for above must be made on Board of Education official voucher form which may be obtained from the Secretary's office of the Board of Education
2. Unless otherwise directed all correspondence concerning this order should be addressed to Secretary, Board of Education, Lincoln, Nebraska.
3. ☞ No order will be honored which does not have the Secretary's signature or that of his authorized agent.
4. Present voucher for payment not later than first of month following date of this order.

BOARD OF EDUCATION

.....Secretary

By.....

(This sheet for addressee herein named, and to be retained by such.)

Form 9
Original 8-3/4" x 10-1/4"

Footnote on duplicate quadruplicate, and quintuplicate copies of Form 9.

Terms—Merchandise.
Lincoln orders—2% ten days from first of following month.
Other orders—2% ten days from date of invoice.

Budget Balances	General Budget	Department Budget
Dr.	$	$
Cr.	$	$
Estimated Cost	$	$
Actual Cost	$	$
Totals	$	$
Budget Balance	$	$

Budget Clerk .....
(Sig. Instructor Submitting Order.)
.....
(Sig. of Supv. Prin., Etc., Submitting Order.)

Approved .....19..... Supt.
Ap .....19.....
Ap .....19..... (Sup. of Rec. and Sup.)
Ap .....19..... (Chairman Inst. Com.)
Ap .....19..... (Chm. Gen. Con. and Mtn.)
Ap .....19..... (Chm. Cap. Outlay Com.)
Ap .....19..... (Chm. Oppr. and Main. Com.)
Ap .....19.....
Secretary.

(This sheet for Claim File—Secretary's Office.)

Terms—Merchandise
Lincoln orders—2% ten days from first of following month.
Other orders—2% ten days from date of invoice.

IMPORTANT—Do not retain triplicate copies of orders longer than 10 days without permission of the Secretary's Office. Triplicate copies are required for auditing bills.

STOREKEEPER:—
Has the above been furnished and is same entirely in accordance with this order and satisfactory? If not, please advise specifically with return of this communication. Otherwise date and return with your approval.

Secretary:
This order has been complied with, except in the following particulars: .....Secretary

.....
Date SIGN HERE X.....
.....Storekeeper

(This sheet to be returned to Secretary's office after delivery has been made or service performed.)

Footnote on triplicate copy of Form 9.

since all must account for the materials which they use, to the board.

The next order of procedure is to post the items from Form 1 to the continuous invoice Form 3. The filling out of these forms, and the posting take only a few minutes, at the time when the transactions are made, but they save a great all the common woods and other materials used by the boys is kept on hand in the school shop, and this order is filled from this stock.

When a boy is ready to make any project, he must present the drawing that he has made, and an estimated stock bill written out on Form 4. He must further fill out the yellow

card (Form 5), which finally will contain a record of all the work which he has performed throughout the year. When the boy gets lumber or other supplies for this project he fills out requisition Form 6. The requisition is then given to the instructor who files it with the student's stock bill. The main use of this form is to assist in checking materials given to the student. When the project is finished, the student checks up his requisitions and posts them on his stock bill, thus obtaining an accurate account of the cost of his project. He then pays his bill and receives a receipt in return. At the close of each month a report is made to the supervisor on Form 7, thus showing the condition of the instructor's budget at the time the report is made. Form 7 is shown as it would appear at the end of the school year. The amount from stores for any month is taken from the continuous invoice for that month and the credit claims from the receipt book.

In case supplies, such as hardware, for example, are not ordered through the regular channels, the instructor purchases whatever supplies are needed and reports them on Form 8. If by chance, some special pieces of equipment, or some tools are needed, an Order of Purchase, Form 9, must be first obtained by the instructor. This form will permit him to go to the hardware or wholesale house and get what is needed. The bills from the firm where the purchase was made, must be attached to this form before they are presented to the board, otherwise they will not be allowed.

This system has been used in our schools with great success. With our continuous invoice, job cards and orders for work for the school, we are able to tell exactly what we paid for anything in the shop, what every boy is doing, and where every piece of material is to be used. The system requires little of the instructor's time, and it fits the needs of the smaller school systems as well as those that are larger.

The care and replacement of tools is also a large item in the shop finances. The easiest method I have found after much study of the subject is also quite simple. We have a toolroom where all tools are kept, except the individual kits which contain a jack plane, backsaw, brush, rule, try-square, and marking gauge. One of these kits is kept at each bench. A different tool boy is assigned to the toolroom each week. When he goes into the toolroom he first checks to see that everything is in place. Then as the students call for their keys, he gives them a slip (Form 10). Each boy then unlocks his bench, and checks his tools by drawing a line in the space "condition" as indicated, signs his name and returns it to the toolroom man at the close of the period with his key. These slips are filed by classes by the toolroom boy, and act as an attendance record. If a special tool is wanted by a student, he fills out Form 11 and brings it to the instructor for an O.K. In this way the instructor knows what the student is doing and at the same time has a check on tools that are being used. The toolroom boy hangs the O.K'd slip on the hook from which he takes the tool. This is his authorization for letting a tool out of the toolroom. If another instructor or anyone in another department wants a tool, the same procedure is followed. It is easy at any time to find out who borrowed a tool and where it may be obtained if it is not returned. This cuts down the loss of tools, especially at such times when various things like school floats or stands for parties, etc., are made or when the maintenance department may need additional tools.

To summarize, by means of this system we have everything in writing with definite records filed which take little time or thought. The system prevents misunderstandings, reduces loss of tools and promotes general efficiency.

AROUSING INDIVIDUAL INTEREST IN PRINTING

Adolph L. Juten, East Junior High School, Duluth, Minn.

A BOY who has completed a semester's work in a cabinet shop has a piano bench, a sewing cabinet, or some project of a like nature as a result of his efforts. The boys of the sheet-metal shop, the forge shop, the electrical shop, and the wood-turning shop also have their series of useful projects. Every effort which the boys in these classes put forth, go directly into some piece of work which they can take home and proudly set before their parents. The praise which their work receives at home means more to these boys than all the 90's or 95's that the instructor can give. Such praise inspires the boy to speed the completion of the next project, so that he may again hear words of approval about his work.

The boy completing a semester of printing rarely has the opportunity to hear any words of praise for work that he has completed, for he finds, when the semester is over, that all of his efforts that were not directly put into practice exercises, have been expended merely to exist as a small part of the large mass of printing which his class has done for the school.

It is usual for the printing course to consist of a series of exercises, and any time which remains after these are completed is used in producing the school printing. It does not mean much to a boy of junior-high-school age to say, "I set those two paragraphs of the school paper" or "I helped set that job." As a matter of fact, after any particular job has been completed, it is difficult for him to point out the part of the work which is attributable to his efforts. His parents do not seem to feel that what he has done is of great moment. The work does not even show that he was engaged in it, for nowhere does it show his individual mark or name. Because of this state of affairs, it becomes the duty of the printing instructor to create the opportunity for his students to hear their work extolled.

It is not possible to rearrange the course of printing so that each boy prints a book to take home, but it is possible for each boy to possess a notebook with his name printed on it in which to keep his practice jobs. It is also possible to see that his name appears in the school paper once or twice a semester in connection with the work of the printshop.

A good plan is to allow one or two boys to do each school job in its entirety, and when the job is completed, let their names on the job attest to the fact that they are the producers. It is a natural craving in the boy to want to see his name in print, and this craving can be satisfied in this way. It is surprising how much satisfaction the boys get out of having their names at the bottom of a football poster or of a four-page concert program. In fact, it is his only way to tell his friends and his parents that he has accomplished something in the printshop. The printshop teacher, therefore, should be generous with the paper and give a few proofs of every job to the boy who set it, so that he can take them home to show to his folks, and to his friends.

This will encourage the boys to renewed efforts in their practice jobs, for they will soon discover that only those who are fully up to date with their work get assignments to the special work which merits the extra recognition of receiving specimen proofs that may be taken home.

INDUSTRIAL-ARTS MAGAZINE

EDITORS

E. J. Lake *J. J. Metz* *S. J. Vaughn*

AFTER THE SUMMER

The order of seasons has different significance for different people. To the teacher, autumn is not a time of harvest and prospective relaxation, but a time for girding up the loins and jerking up the spirits to the responsibilities of a new and better year.

We know that there will be change and improvement in school affairs. No business is more prosperous the country over than this school business. We know there will be plenty to do and a reasonable opportunity to do it well.

This is a country of extremes. We seem never to get settled into a routine of the best method or manner of school procedure. Just as we feel satisfied with ourselves and what we are doing, some new proposition comes up and our suspicions are aroused against ourselves. There always seems to be something to learn, some innovation worth trying, some success that we must have a share in.

While we are young in the teaching game, the method of teaching, and the list of things to be taught, seem fairly well established, but we lack confidence in ourselves. After we get old in the teaching game we know not what the year may bring forth and in self-defense must keep our weather eye open.

But old as we may be in years, we may not permit ourselves to grow old in spirit. Let us be thankful that it is so.

SPECIAL ACTIVITY WEEKS

While many people think it is merely a fad to dedicate a day or a week to this, that, or the other movement, no matter how worthy, yet it cannot be gainsaid that this periodic emphasis is a good thing and serves a real need. It is a well-known fact that one's mental picture becomes more hazy as one moves away both as to time and as to distance from that which produced the mental picture.

The electrician who is continually handling high-potential wires, quickly loses his original fear of them. In a short while, he works upon these circuits, nay, takes chances with them, that he would never have dreamed of when he commenced his high-potential work. It is true, he still uses precautions, yet his very familiarity with the work often spells his undoing.

To counteract this gradually increasing feeling of security which makes one feel immune against the things which threaten our very existence, it is good that we are reminded by a this-or-that day or week now and then. They remind one that these dangers are still in existence, even though a kind providence has protected us in our heedless and self-complacent journey through life.

Take, for instance, the *Fire-Prevention Week* which has just passed. What a fine opportunity it offered to the teacher for bringing home to the pupils the much-needed admonition against the careless habits which turn this God-given element from a blessing into a curse. But is it enough to merely preach the gospel during that one week? Is it not much more beneficial to continually and conscientiously practice it yourself and to insist upon its practice by the students as well? How many times is the teacher the one who lets an oily rag lie under the bench? How many times is it his negligence that allows dangerous accumulations of wood and shavings to gather in obscure corners where they may not offend the eye, but where they form a target for the carelessly discarded match.

It may be said "If fire-prevention practices form a part of our work throughout the year, we do not need a special Fire-Prevention Week." If it is really true that this work is religiously carried on throughout the school year, nevertheless Fire-Prevention Week should be emphasized with all the power at our command, lest the continued weekly reiteration through its wearying sameness becomes a curse rather than a blessing.

Fire-Prevention Week in such a program really accentuates that which is regularly taught. It adds its admonition to the already existing note of warning, "Avoid Creating Fire Hazards."

The mere fact that we have a week in November which is designated *Education Week* does not mean that this is the only time that a special appeal for continued education should be made to the students. On the contrary, the special activities of this week should merely emphasize and accentuate the program that has been followed throughout the year. Boys' week, and youths' week, and fathers' and sons' week, and boy scouts' week, all have their mission and serve their purpose, and the wide-awake industrial-arts teacher makes the most of the opportunities which these various weeks present to him.

COOPERATION

To many administrators and supervisors, cooperation means, "Do as I say without a word of comment." This attitude assumes that it is the administrator or supervisor who does the thinking and the teacher who executes the imposed thoughts. It never dawns upon these administrators that they must cooperate with teachers as much as teachers must cooperate with them.

This notion which imposes a more or less military routine upon education is fortunately disappearing from our present scheme of democratic educational philosophy, but, nevertheless, it is still lingering here and there. It is usually found among old-time administrators who still adhere to the notion that one removed from the actual teaching situation can sense the best class procedure and policies.

The wise administrator cooperates to the fullest extent by improving the classroom teaching by helpful suggestions, by a sympathetic understanding of the problems which confront those who are doing the work with the students, and by recognizing the fact that two heads are better than one. He realizes that cooperation is not interference with the good which is being accomplished, and gives his teachers credit for being able to do some thinking, too. He thinks a thing through, discusses it with the teachers affected, changes his opinion when found advisable, and, with as little supervision as is necessary, waits for results.

Cooperation in a democratic society means the respect for the ideas of all concerned, the working together of all toward a common goal. It is a program to the solution of which both administrator and teachers contribute.

CONVENTIONS

The season of conventions is again upon us. There are conventions of many and diverse kinds. Those interested in the educational work of this country also have their conventions, and it is these teacher conventions which are of especial interest to the readers of the INDUSTRIAL-ARTS MAGAZINE.

We hear a great deal about objectives nowadays. The objective is a vital part of each lesson because it acquaints the student with the reasons for taking up that particular lesson. To many of the teachers, the convention also is a mere drudgery, just as the average lesson is a drudgery to the average boy unless he is properly acquainted with the reasons for studying the lesson. To help these teachers get the right attitude on convention attendance, it may be expedient to set

up some objectives. Knowing what one is to attain through attendance, a convention may become as helpful to the average teacher as its promoters hope it to be. What, then, are these objectives?

The objectives of educational conventions are to offer to the individual teacher on whom devolves the working out of details, an opportunity:

1. To get a glimpse of the entire field which those in the administrative positions must envision;
2. To learn how fellow teachers in different parts of the country are solving the very same problem which proves troublesome in his own classes;
3. To become acquainted with the leaders and thinkers in educational work;
4. To present his own solution of the educational problems of the day;
5. To gain the inspiration which comes with the knowledge of being a fellow worker in a great undertaking;
6. To see how other cities are attacking the educational problems of today;
7. To see what industry has made available for his use in the classroom in the form of books, tools, machines, classroom equipment, and teaching aids.

In order that a given convention may actually measure up to these objectives, the individual must contribute his share. He must, first of all, clear his own mind of the cobwebs of I-know-it-allism. It is only the open-minded person who can hope to learn anything at these gatherings. Of course, not everything that is heard at a convention will bear the scrutiny of actual application. Of course, not every solution presented will be the solution that has solved your difficulty. Of course, not every part of the program will be of equal interest to you. Of course, not every speaker will be equally eloquent and pleasing to listen to. But just as your students are getting out of your instruction in the proportion to their own activity in making your teaching a part of themselves, in the self-same measure will you derive benefits from the conventions which you attend if you try:

1. To understand the objectives for which it is held;
2. To make every part of the proceedings contribute something to your work;
3. To make use of the entire program as a means of enlarging your own educational background.

OUR PRESIDENT ON ART

President Coolidge made these remarks before the American Federation of Arts and the American Association of Museums, at their joint meeting in Washington last May:

"It is especially the practical side of art that requires more emphasis. We need to put more effort into translating art into the daily life of the people.

"Through science and invention, gradually but surely, we are banishing the drudgery of existence and bringing into every avenue of living a touch of the artistic.

"We are working out the ideal under which all will realize that they are artists, in their employment, in their recreations, and in their relations one with another."

In these three statements the President of our country gives to the discouraged art teacher all of the encouragement that should be needed, and gives to the hectic art enthusiast a thoughtful aspect of affairs that should steady his activities.

This President of ours did not "choose to run" but he has mapped out a most thoughtful and persistent means of locomotion for all that.

LOOKING FORWARD

Now that vocational education is no longer an experiment that may be dropped from the school curriculum, we can turn our thoughts from a program of justification to one of improvement.

Much has been done already by way of laying a foundation, but it rests upon the younger vocational men to sense the necessity of keeping abreast of the times and incorporating the necessary changes. Many problems are clamoring for solution, and they require the combined efforts of all to tentatively solve them. The adult-education program launched a few short years ago, the proper age and grade for trade-school entrants, the best compulsory school age, the including of an adequate character-development program, the spreading and working of an adequate vocational-guidance program, the induction of boys into industry, the most successful classroom methods of instruction, the better cooperation between school and industry, and the many local factors which trouble the administrators are some of the problems which need to be solved. Never in the history of vocational education, has there been a greater need for real men to face real problms.

FAILURES

It cannot be said that the average shop instructor is guilty of failing many over the recognized 10 per cent of his class. In most places the percentage is far below the proverbial ten. That shop instructors have failures, however, cannot be denied. The following question naturally arises for us to answer: When is a student's failure justified?

The answer to this question is simply, "When the failure cannot be prevented." Some failures, however, might be prevented if the teacher tried to cultivate a little more sympathetic understanding of the student's problem; if he gave a little extra service to the backward student after the closing or before the opening of school; if he tried to appeal to the boy through the boy's hobby; if he gave encouragement and consideration at all times; if he remembered that the backward student is a part of a class for whose benefit the teacher's position was created; if he made a careful study of the individual to discover the good which is always there; if he used *constructive* criticism, and gave it diplomatically; if he improves his personality, knowing that courteous, manly treatment begets the same treatment; if he refused to permit failure by trying every means that might appeal to the pupil.

Failure, at times, is inevitable, but with a serious desire to overcome it in the classroom, with a persistent effort and conscientious endeavor to eliminate the evil, many of the failures will disappear. Some of our greatest men were failures in early life. Perhaps some of our shop failures will owe their later successes to your encouragement and service.

ABILITY, NOT QUANTITY

Many shop students are so intent upon the completed project that they very often stress quantity production. They hasten from one job to another, always holding uppermost the number of finished jobs as a criterion of accomplishment. This attitude is strengthened in many mechanical-drawing rooms where a specified number of plates must be completed for a satisfactory passing of the subject.

It is the instructor's duty to insist upon ability to do, regardless of the number of projects or drawings turned out. Three or four jobs well done might have more value for an industrial-arts student than fifteen or twenty that are poorly done. The shop and drawing instructor should stress the ability to do the job and not the number or usefulness of the finished projects.

The ability to do things is gained by doing things, but this does not mean that by doing things quickly and poorly that desirable ability is acquired. If we stress the thinking process more, and the production process less, our school shops will take on more of an educational atmosphere.

THE EQUIPMENT OF THE PAPER-HANGING SHOP

Claude H. Ewing, Washbourne Continuation and Trade School, Chicago, Illinois

Part II

TO give instruction in paper hanging does not require a specially built shop. A very effective program can be carried on in an ordinary classroom.

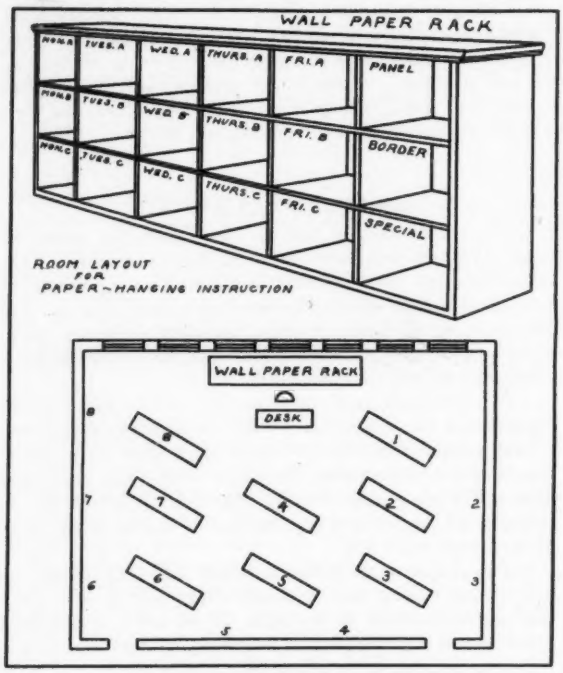
The most important feature of the shop is light. To learn how to prepare and hang paper requires good light. Natural light is best, but can be very effectively aided by artificial light when necessary. Light is, of course, one of the things considered in the construction of all schoolrooms, so in most cases any room used for other school purposes will be suitable for this type of work.

As shown in Figure 1, the room used for apprentice training in paper hanging in the Washburne Trade School at Chicago, is an ordinary schoolroom with windows on one side of the room. It does not matter from which side the light comes as the paste tables can be arranged so that the light falls properly on the paper.

Then the wall space available must be considered. It is necessary, of course, that the wall surface be smooth. At least 100 sq. ft. of wall space and 50 sq. ft. of ceiling space should be allowed for each paste table. This will care for two students.

The average schoolroom will usually accommodate a class of 16 to 20 students. It will be necessary to remove all the blackboards except a small section which should be retained for instruction purposes. The wall where the blackboards have been removed should be plastered flush with the rest of the wall, using a mixture that will give a hard surface. Avoid a thin lime coat, if possible.

If the wall is extremely high, 12 to 14 ft., or over, it is advisable to have two moldings put around the room, one 15 to 18 in. below the ceiling, and the other at least 7 ft. above the floor. This will divide the wall space into three sections, one of which will go with the ceiling and can be used to give instruction in hanging the frieze or drop. The lower one for the regular work, being high enough to require the use of a stepladder, while the middle section can be reserved for project work, illustrative material displays, or special jobs done by instructor or pupils. The wall surface should be either painted or sized with a varnish size. It should then be waxed except where permanent work is to be done.



Either flat paint, gloss paint, or cheap enamel can be used for this purpose. If the wall is sized, gloss oil or cheap varnish thinned with turpentine, or turpentine substitutes, can be used. The wax for waxing the wall can be prepared by melting 1 lb. of ordinary paraffin wax in a pail placed in hot water on a flame or stove. After it has melted, add 1 qt. of linseed oil and mix the two together. When wax and oil are well mixed, remove the pail from the fire and add 1 pt. of turpentine to the mixture. A very thin coat of this mixture on the surface will keep the paper from sticking too tightly so that it can be readily removed for the next class.

The walls and ceiling of the room shown in Figure 1 require only one coat of wax per week, although they were used by 260 apprentices, each working two hours per week.

Where funds are available for an extensive program, additional surfaces can be provided by erecting partitions in the room forming small rooms, or by building a balcony, but care must be taken not to sacrifice light and instructional facilities for space.

The floor space necessary for a paste table which accommodates two students is approximately 10 by 10 ft., as the paste table must be away from the wall and also placed properly for the light and allow room for the workers.

Figure 1 shows the tables placed for right-handed workers. This layout would be very much disturbed if a left-handed worker were placed with the class, unless there were sufficient room to allow this individual's table to be placed at a different angle, so that he could get his light from the proper side.

The ceiling space should be directly over the wall space allotted to each paste table, and the wall space should be at least 6 ft. wide. This will allow the student to hang five strips of 18-in. paper, four on the ceiling and one on the drop or frieze.

The classroom should be equipped with a sink so that brushes may be washed, pastes mixed, and the cleaning-up process be taken care of without leaving the room. A small gas plate also is necessary to mix sizes and heat water for flour paste.

Paste-Table Equipment and Hand Tools

The following list of equipment may seem rather long, but consists of many inexpensive items. The total cost of such equipment for one complete set should not exceed $20, even though all items bought are of the highest quality. Each set of equipment will care for two students.

Pasteboards	Smoothers
Trestles	Shears
Drop cloths	Seam roller
Straightedge	Rule
Stepladder	Knives
Plank	Scraper
Paste pails	Tear stick
Water pails	Chalk line; plum bob; holder awl
Sponge	Base trimmer
Paste brush	Apron

Description of Equipment

The pasteboards should consist of three ½ by 12 in. by 6-ft. boards of a light, hard, close-grained wood. Apprentices

bear too hard on the knife and by using the boards instead of a table, the boards can be turned and every edge (12 in number) can be used for trimming before the table has to be resurfaced. As paste tables are made of thin material, and since in classroom work there are seldom more than five or six strips on the table, the boards will warp. The loose boards recommended in the foregoing are therefore to be recommended as they can be turned so as to make better contact between the straightedge and paste table.

The trestles should not be attached to the boards. They should be of the folding type which may be adjusted in height. These folding trestles can be easily stored or moved from place to place. By drilling a hole through the horizontal part of the trestle at each of the notches and also through the two legs, it is possible by means of a stove bolt, to clamp the legs and horizontal part together, thus making the trestle more rigid and less apt to fall apart when being used by an apprentice who leans too heavily upon the table.

A small drop cloth, 6 by 8 ft., of light-weight duck should be used under each paste table, or if the necessity for extreme economy exists, scraps of 30-in. wallpaper, face downward, may be used. These should be changed after each class to give the classroom a nice clean appearance.

The straightedge should be of hard maple, 6 ft. long, brass bound without screws on the edges.

Stepladders for paper hanging should be light, and braced a strong rope or small chain between the front and rear legs. Rigid braces do not allow the worker to handle the ladder with one hand. This is necessary, however, for the best results. A 5- or 6-ft. ladder is required for lower wall work, and an 8-ft. ladder for higher work. A stepladder more than 8 ft. high is too clumsy for classroom work.

Small 6-ft. extension planks, that can be extended to 10 ft., are large enough for classroom work.

Paste pails and water pails may be the same if some means of marking is used so as to keep the water pails clean for washing. They should have a capacity of 12 qts.

Sponges of a good grade, approximately six to the pound in size, are suitable for classroom use.

Paste brushes, 8 in. wide with a handle like a paint brush, must be supplied. Do not use the old type of whitewash brush. The bristles of these brushes must be of good grade set in rubber. Apprentices give brushes very hard treatment hence only the most sturdy brushes should be provided.

A smoothing brush, 12 in. long, with good bristles set in rubber should be provided. Those with rather stiff bristles to stand the wear should be chosen. A gray russian bristle seems to be more lasting than others.

Shears, not scissors, 12 in. long, of a good grade to stand dropping and amateur use are required. Several left-handed shears may be necessary.

The seam roller should be either smooth hardwood or bakelite. The best are made of ivory, but, of course, these are too expensive for classroom use.

The ruler should be 2 or 3 ft. long. The average paper hanger prefers a 3-ft. rule in four parts, but these do not prove to be good for school use as they are easily broken.

Trimming knives, both round and square point, should be provided so that the apprentice can determine which is best to use. The knives should be of the best grade as it is impossible to keep a knife perfectly sharp even though the best is used.

A scraper 3½ in. wide and semielastic should be provided for removing paper. If too stiff, the plaster is liable to suffer. The semielastic scraper can also be used for patching, thus saving an extra tool.

The tearing stick can be made in the woodworking shop. It consists of a piece of hardwood, 20 in. long for 18-in. paper, and 32 in. long for 30-in. paper, planed smooth and slightly beveled on both sides in such a way that either edge can be used for tearing.

A chalk line 25 ft. long wound on a spool equipped with an awl and a small plumb bob should form a part of each outfit.

The base trimmer can be omitted as it is advisable that the apprentice have as much practice as possible with the shears. If they are provided, however, they may have either a smooth wheel or one that perforates the paper.

An apron made of heavy duck, with a wide pocket across the front and a small pocket for the knife, is handy if the students are not equipped with paper hangers' overalls.

The instruction equipment necessary is a bin for material similar to that shown in Figure 1.

Table and chairs, or tablet arm chairs for taking notes and making sketches, also should be provided. Besides these, a small case or shelf for books or reference material, a locker for small equipment not in use, and a desk for the instructor, together with file cases or lesson-sheet cabinets for instruction material, are required.

The last named items are usually found in the classroom. They need not be of any particular design. The material bin can easily be constructed in the woodworking class.

STUDENT RATING IN INDUSTRIAL ARTS

Stanley Powell, Supervisor of Industrial Education, Warren, Ohio

SINCE the introduction of the junior high school as a part of our educational system, many changes in the function of our schools have become possible. More and more we are fitting the schools to the needs of our children. We look to the junior high school as a place where the adolescent child can do exploratory work to discover the work he likes best. Needless to say he must be assisted in making his choice and his decisions.

One of the functions peculiar to the junior high school is the work in prevocational education offered through the medium of the various courses in the industrial arts. To the average layman, and indeed to many of our regular teachers, the choice of the courses offered under the title of industrial arts and the reasons for their introduction into the regular schoolwork are not clear. The thought seems prevalent that these courses are in our curricula for the primary purpose of giving manual instruction merely to have a boy make some object.

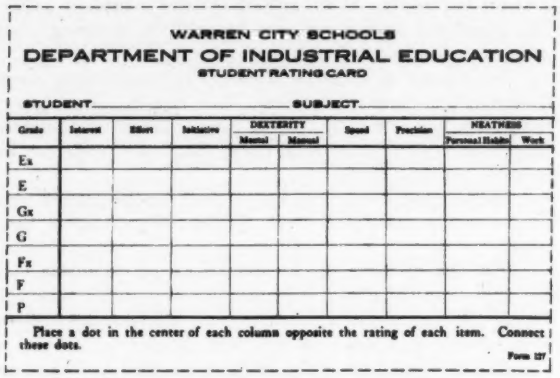
It is agreed that one of the reasons for shop activities is that the motor-minded child has a medium by which he receives more beneficial instruction than perhaps he would in any other subject. Besides this, these courses serve as a splendid means of motivating the academic subjects. In addition to the foregoing we find that it offers one of the best mediums for the checking of aptitudes.

If we stop to consider and analyze the work taught in shop courses, we find that the same psychological approach is used in shopwork as is used for the other school activities.

In our junior high school, we felt that we had built up and outlined a rather complete course for each industrial subject, yet there seemed to be something lacking. This became more and more apparent when boys would come to us for

counsel in regard to their schoolwork for the next year. Apart from those who seek advice for next year's schoolwork are those who wish advice about jobs. Then, there are cases where the student thinks he would like to leave school and attend a private trade school. In the majority of the latter cases we found that they were attracted by sensational advertisements. All of these various cases called for sound practical vocational guidance.

Our study of this matter of guidance led us to the conviction that the regular grade card did not convey all the information that is necessary to do a real job of guidance. The problem then arose just what information was wanted, and to whom the information might be of value. After much deliberation, the information disclosed by the rating card was of special interest (1) to the student, (2) to the teacher, (3) to the principal, (4) to the student councilor, (5) to the parent, and (6) to the prospective employer.



WARREN CITY SCHOOLS
DEPARTMENT OF INDUSTRIAL EDUCATION
STUDENT RATING CARD

STUDENT_____ SUBJECT_____

Grade	Interest	Effort	Initiative	DEXTERITY		Speed	Precision	NEATNESS	
				Mental	Manual			Personal Habits	Work
Ex									
E									
Gx									
G									
Fx									
F									
P									

Place a dot in the center of each column opposite the rating of each item. Connect these dots.

Form 127

FIG. 1. STUDENT RATING CARD. THE ORIGINAL CARD MEASURES 4 BY 6 IN.

A careful study of the headings on the rating card shown in Figure 1 shows that they will give a clear, concise, analysis of the aptitudes of the specific boy under consideration. The reasons for adopting the headings shown on the card are as follows:

Interest: This is a personal quality and would indicate whether the student considered the work with a feeling of worth. If not, the instructor would do well to investigate whether it is the presentation of the subject that is at fault, or whether other circumstances impair the interest factor.

Effort: This is so closely related to interest that the cause for a low grade under this heading can usually be found through lack of interest. However, we sometimes find that a student will consider a subject interesting and worth while, but is inclined to be lazy.

Initiative: This is a quality which the teacher can help develop, but it must be admitted that all boys will never possess it to the same degree. It is, however, an important factor to be considered when doing guidance work.

Mental and Manual Dexterity: This may seem an odd way to use the word "dexterity," but a little thought will soon make it clear that mental dexterity applies to the right way of thinking as much as manual dexterity applies to the right way of handling things. There are many students in shops that will rate high in mental dexterity, and vice versa. We find that all too few of them will rate high in both, but we must be very thankful that it is only a few who will rate low in both. From this we should be able to select the boys who may make good craftsman but lack mental ability to become engineers. On the other hand, who may seem awkward with tools may have the ability to grasp the underlying principles and theory.

Speed and Precision: It is well that students be made to realize the importance of speed and precision. Either of them without the other is of little value. They are economic factors that play a very important part in our modern industrial age.

Neatness: It is necessary that young people appreciate the fact that habits reflect character. We, as teachers, should endeavor to inculcate in the youth the feeling of responsibility and develop this part of their character by the proper use of corrective measures. By doing this, we have a right to feel that the student will not have studied our subjects in vain. One of the things that the training of neatness cannot help but develop is the feeling of appreciation for the thing well done and the desire to maintain this standard.

Armed with the information disclosed by such a rating card, which gives a graphical representation of a boy's make-up, the councilor has at least a factual basis upon which he can rest his attempt at guidance in individual cases.

DEVELOPING THE IMPULSE "TO ACHIEVE" IN MECHANICAL DRAWING

A. K. Rigast, Eureka High School and Junior College, Eureka, California

THE impulse "to achieve" is one of man's most important characteristics. Without this urge, civilization would hardly be possible. The term "achievement" implies many qualities, such as ambition, interest, perseverance, industry, accuracy, thoroughness, and effort. In order to achieve, we must want to achieve.

The term refers to the different steps we take toward the goal, as well as to the final result. In football, the immediate goal is the winning of the game. There are, however, a great many steps to be taken in the achievement of this aim. These may be great achievements in themselves. Thus, a good pass, or a double pass, may throw the spectators into commotion. They recognize achievement. These passes, however, constitute only parts of the whole. The final score is made up of the sum total of the minor and major achievements of the whole game.

Imagine a mountain climber scaling a high peak. His goal is to reach the summit. Each step he takes toward the goal is an achievement, a very small achievement, to be sure, nevertheless, all added together, they constitute the final goal, the supreme achievement.

Achievement, therefore, is the whole process of accomplishment. It involves those essentials of man's character which carry him toward the goal set by himself and by society.

Goals for the Teacher and the Student

It is impossible to teach achievement as a regular school subject. The feeling of achievement is the result of our mental or physical activities. It can be developed only in connection with the job.

The goals for the teacher and the student are substantially the same. The difference lies in the method of approach. The teacher leads, and the student follows; the instructor points out the goals to be achieved, and the pupil endeavors to reach them.

In mechanical drawing there are two distinct goals toward which the teacher must lead his pupils: The practical, and the moral. The practical goal has been achieved (1) when the student has become thoroughly acquainted with as large a field in mechanical drawing as possible, and (2) when he is not only able to read and interpret blue prints, but is also able to make working drawings of those objects which he may make at some time either at home or in the school shops. The moral goal has been achieved when the pupil has formed habits of industry, of neatness, and of accuracy in his work. The plates must

be neat, the drawing must be accurate, and the student must be industrious at his work.

Means and Methods to Arouse the Will to Achieve

The prerequisite of achievement is the will to do. No good results will ever be achieved unless the students are enthusiastically willing to work. The impulse to achieve must be kept alive and cultivated by divers means.

The very first of these means is the establishment of confidential relationship between teacher and students. If the students lack confidence in, and respect for, their teacher, no satisfactory results will be achieved. In order to inspire the students with confidence in their instructor, he must be a master of his subject. The pupil must not be allowed to form the opinion that he knows as much of the subject as the teacher does. Knowledge of the subject without the ability to impart it to others will avail the teacher very little. Poor teaching will never inspire students with confidence in their instructor.

From the very outset, the student must be shown just what is expected of him in the way of quantity and quality of work. It is essential, of course, that different amounts of work be required from different students, because of individual differences. No single standard can be set for the whole class. If a standard is set higher than the ability of the student warrants, he soon becomes discouraged; if the standard is too low for the student's ability, he will loaf on the job. In both cases he will acquire wrong habits.

The importance of neatness and accuracy must also be stressed from the very start. It is well to impress upon the minds of the incoming freshmen that only their very best work will be accepted.

These preliminary announcements and discussions will start the students thinking along the proper lines.

In order to provide an incentive for the student to do the best he can, it is well to arouse his imitative instincts by displaying drawing plates selected especially because of their neatness. The display of good work always exerts a very stimulating influence, especially if the students know that it is the work done by other members of their class. They congregate around such exhibited drawings, discuss them, criticize them, admire them. It is natural for the students to desire to see their own work displayed in this manner. The teacher also can make use of this exhibit in urging backward students to try to do better. "If those boys can do such fine work, why can't you? Try. I will help you."

The display of commercial drawings also has a very good effect. The instructor should point out to the students that the work which he teaches follows the accepted practices of the commercial drafting room. The student's realization that his work compares favorably with the work used in an industrial plant, will get greater confidence in himself and in the course which he is taking at school.

A dozen or so of well-chosen plates also may be exhibited in the main halls of the schools. They will draw attention to the type of work done in the mechanical-drawing classes and will prompt other students to choose this particular course. It will stimulate the drafting students to do their very best in the hope that their drawings may be thus exhibited.

Annual or semester exhibits may be made important events. It is best to hold them in conjunction with other departments and to make them neighborhood or community affairs. To this end, it is well to locate them in some centrally located school or public hall. Exhibits of this kind give the community a cross-sectional view of the work accomplished in the school and they also give an opportunity to honor those students who do exceptional work.

Another method of developing the impulse to achieve is by means of inspirational talks. These should not be in the form of a sermon but should be made interesting, short, and to the point. The incoming freshmen can be acquainted with the work accomplished by the beginners in the previous year. The advanced student can be praised for what he has already accomplished and be lead on to still higher attainments.

The principal of the school may also be asked to make a short address from time to time in order to make the students feel the importance of the work that the course is offering them, and in order that they may receive an added stimulus for producing good work. It has also been found beneficial to invite representatives of the engineering and architectural professions to make addresses to the drafting students. Suggestions made by these men will carry a great deal of weight with the members of the mechanical-drawing classes.

The value of setting high standards has already been touched upon. Students quite readily will accept the standards that are set. As soon as they realize that the phrase "get by" does not exist in the instructor's vocabulary, they will exert themselves to produce acceptable work. To maintain these high standards, the instructor must grade the finished work conscientiously. Some teachers assign grades according to the general impression which a drawing produces upon them. This subjective grading is very unsatisfactory as it accentuates some phases of the work at the expense of others. The grading should be as objective as humanly possible. The factors that should be considered are neatness, accuracy, industry, thoroughness, initiative, quality of lines, figures, arrows, notes, etc. A definite percentage value may be assigned to each of these factors. Then, when the student is informed of the method of grading and the percentage value given to each of the factors enumerated, he is in a position to realize how he can achieve higher standards. The result will be larger quantities of more uniformly good work.

The criticism of the student's work should always be constructive. Mistakes should be pointed out, it is true, but the method of remedying the mistake and how to avoid it in the future, should always accompany the statement. In this way no antagonism or resentment will be aroused.

Personal interviews, the purpose of which are vocational and educational counseling, have much to do with the development in the student of the purpose to achieve. In these interviews, the point of view of the student who elected mechanical drawing merely because he believed it to be a snap course, can be altered so that the course becomes one of purpose rather than of passive acquiescence.

In order to find out at first hand whether the doing of a good job aroused a feeling of achievement, the students of a particular class were asked to write down their reactions. The following are a few examples:

1. (Freshman, first-year mechanical drawing.) "When I handed in that particular drawing, I wondered whether or not you would accept it. I had an idea that you would not accept it, and I am glad you did not, because no doubt I would have repeated the same mistakes on the next plate. I feel that it was for my own good that you made me do it over."

2. (Freshman, first-year mechanical drawing.) "I felt that I have done my best in producing that drawing, and as I looked at it, I had a feeling of having done a good job."

3. (Sophomore, second-year mechanical drawing.) "When a job is assigned by the instructor, the first feeling that comes to the student is that it is hard, but as he goes ahead, forms a picture of the job in his mind, he begins to like his work, and in the end, if the work comes up to the standard of the picture he has formed, he is satisfied with his work because he feels that it is the best he can do. If, however, the work does not come up to the standard, he has a feeling of regret, realizing that he could have done it better had he tried harder. With this thought in mind, he is prompted to redraw the plate even though the teacher has not yet condemned it."

4. (Sophomore, second-year mechanical drawing.) "When a drawing is returned to me, I compare it with the last one I received. I feel much better if it shows improvement. It gives me pleasure in that piece of work."

5. (Sophomore, second-year mechanical drawing.) "When a good-looking, accurate plate with a good mark is handed back to me, I frankly feel as if I have accomplished something, and that I am beginning to get some place. If the plate of the opposite kind comes back, I feel rather ashamed of it and think that perhaps I could have done better had I tried harder."

6. (Special, advanced.) "When I have finished a plate that is neat, has good lines, and good lettering, I feel at ease when I hand it in. When, however, I have finished a plate that is dirty, has lines of uneven weight, and poor lettering, I hate to hand it in. I really feel like tearing it up and starting it all over again."

Conclusion

Very commendable results may be achieved if the students are actuated by the motives and sentiments expressed in the foregoing statements. The impulse "to achieve" is present in all normal boys and girls. It can be cultivated and developed to a very high degree.

The quotations taken from their own writings are indicative of emotional responses which can be augmented and controlled by the instructor for the purpose of achieving lasting values.

SAMPLE CONTRACTS FOR WROUGHT-IRON PROBLEM

E. W. Manzer, Supervisor of Manual Arts, Bronxville, N. Y.

THE contracts presented herewith were developed in the department of industrial education and applied arts, at the University of Wisconsin, for the general metal shop of the Wisconsin High School.

CONTRACT PLAN FOR WROUGHT-IRON PROBLEM

A Contract.

1. Draw an original design for a problem to be made in wrought iron. Make out the procedure sheets on blank forms.
2. Collect 25 pictures of wrought-iron problems and paste them on sheets of drawing paper, size 8½ by 11 in.
3. Write a paper, 500 words or more, on the topic "Wrought Iron in Historic Architecture."

B Contract.

1. Draw a design for a bridge lamp showing an original bridge arm and bracket. (See sample sheet, Fig. 1.)
2. Collect 15 pictures of wrought-iron problems and paste them on sheets of drawing paper, size 8½ by 11 in.
3. Write a paper, 500 words or more, on the topic "Wrought Iron in Early Colonial Days."

C Contract.

1. Draw a design for a bridge lamp using the leg design shown in the blue print, but using an original design for the bridge arm and bracket. (See sample sheet, Fig. 1.)
2. Collect 5 pictures of wrough-iron lamps and paste them on sheets of drawing paper, size 8½ by 11 in.
3. Write a paper, at least 500 words, on the topic "Wrought Iron—What It Is and How It Is Made."

Note: You are to select a contract and then fulfill it by meeting all of the specifications.

When the project is completed and ready for grading, all of the other required work must be handed in.

Don't wait until the last day and then try to get all of the work in on time. Begin at once to plan your work and then work your plan.

If you have any questions, please ask them at the end of the class period.

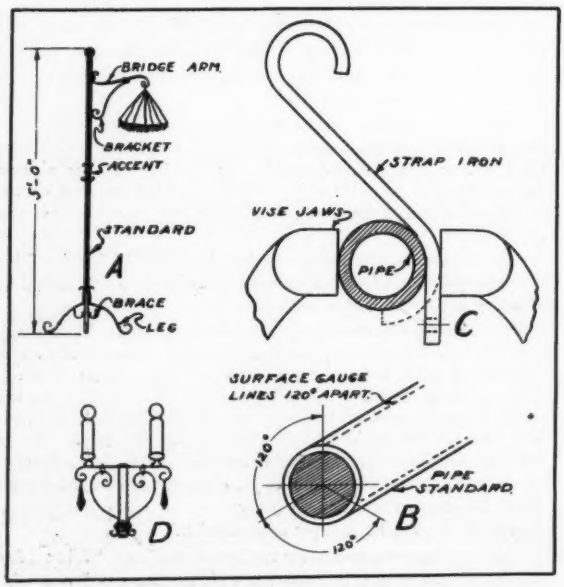
Contract. Wrought-Iron Lamp.

Specifications:

Standard, black-iron pipe ½ in. inside diameter
Bridge Arm, ⅛ by ¾-in. strap iron
Bracket, ⅛ by ¾-in. strap iron
Legs, ⅛ by ¾-in. strap iron
Leg Braces, ⅛ by ½-in. strap iron
Accent, ¼-in. strap iron about $\frac{1}{8}$ in. thick (Scrap stock)
Light Socket, push-through socket, gun-metal finish
Machine Screws, ¼-in. No. 10-24, iron
Rivets, No. 8 iron, button or cone head, $\frac{11}{32}$ in. long

Tools:

Hack saw; ball-peen hammer; breast or power drill; twist drills; scale; surface gauge; surface plate; tap wrench; tap; machinists' vise;



The sketch of the Bridge Lamp shown at A is given as a guide to the student in designing his lamp. The general idea is to be followed but individuality in design is desired in the finished lamp.

Many suggestions for wrought-iron lamps may be secured from magazines or from a visit to some furniture store or gift shop.

The procedure given in the contract will be fitting for almost any wrought-iron lamp. If the student desires to make the problem after the candelabra type, he should design his problem after the sketch shown at D.

All reference readings are required if an intelligent understanding of the metal-work processes is desired. The references are chosen for your benefit. Use them.

Sketch C shows the forming jig.

Sketch B shows the standard divided into 3 equal parts and the lines scribed on the surface of the pipe. The holes for the machine screws are to be located on the lines. Use a "V" block when drilling holes in any cylindrical object.

FIG. 1. INSTRUCTION SHEET. THE ORIGINAL IS A BLUE PRINT AND IS THUS REFERRED TO IN THE INSTRUCTIONS

file; reamer; rivet set; short lengths of pipe, various sizes, for forming scrolls; emery cloth; other tools as needed.

Part I. Legs, Bridge Arm, and Bracket

Procedure:

1. Make a free-hand sketch of your idea for the lamp. Get O.K.
2. Draw a full-size detail of one leg, bracket, and bridge arm. Get O.K.
3. Measure the lengths on the sketch for each part. How will you do this?
4. Measure the lengths on the strap iron. Be sure you are right, then cut.
5. Charge the material on the back of the cost record card.
6. File both ends of all parts. Use a coarse file, then a finishing file.
7. Planish the surface of all the parts if the design calls for this enrichment. The edges only may be planished if desired. Use a ball-peen hammer.
8. Form scrolls on the ends of the legs, bridge arm, and bracket. Refer to the detail. Use the proper size of pipe and vise as a bending jig. Bend cold. (See blue print.)
9. Form curves on all the parts as per your detail. Use jigs.
10. Locate the position for the holes in all of the parts. Use a prickpunch and a center punch. Care must be exercised here to avoid mistakes.
11. Drill all of the holes with a twist drill. What size of drill will be needed? (See Table 16, page 310, Machine Tool Operations by Burghardt.)
12. Clean all of the parts with emery cloth.
13. Rivet the bracket to the bridge arm. Drill the holes for the rivets.
14. Use a file on the rivet head to enrich the surface.
15. Hand in your work for checking and instructor's O.K.

References: Burghardt's Machine Tool Operations, pp. 217-228, 240-254.

Note: Attach a blank sheet to this contract, and note upon it, all suggestions or questions that arise during the construction of your lamp. Your cooperation in this matter will be greatly appreciated. We are trying to make these sheets help you in your work, and if you can assist us, you will be helping others in your class or in classes that take up metal work in the future.

Part II. Standard

Procedure:

1. Cut the pipe to the length specified in your sketch.
2. Charge the material on the back of the cost record card.
3. File the ends and ream them to remove all burrs and sharp corners.
4. Clean the pipe with emery paper.
5. Locate the position of the holes in the standard for the leg and other attachments. (See blue-print sketch.) Use a surface gauge on the surface plate. What idea have you for finding the position of the three lines 120 deg. apart? See the instructor and explain your method. (Ref. p. 231, section 191.)
6. Drill the holes that have been "spotted" with a prickpunch. These holes are to be tapped to fit the machine screw. What size and kind of drill will you use? (Read Section 153, page 178, Burghardt's Machine Tool Operations.)
7. Tap all the holes in the standard. Use a cutting compound on the tap. (Ref. sec. 155.)
8. Fit the parts in place using machine screws.
9. Have your work checked and O.K'd by your instructor.

Reference: Burghardt's Machine Tool Operations, pp. 117-182.

Part III. Leg Braces

Procedure:

1. Form a piece of wire to the shape desired for the brace.
2. Measure the length of the wire. Cut three pieces of ½-in. strap iron to the required length.
3. Form them as per the design and fit them to the leg and standard. Get O.K.
4. Charge the stock on the back of cost record card.
5. File the ends of the braces round.
6. Locate the position for the holes in the braces and drill.
7. Fit and locate the holes in the legs and the standard, then drill the holes.
8. Tap holes in the standard.
9. Rivet the braces to the legs.
10. Fasten the braces to the standard with machine screws.
11. Get O.K. from your instructor.
12. Compute the total cost of the material and make a charge for same on the face of the cost record card.
13. Rub all of the metal parts with emery cloth.
14. Lacquer the parts with shellac thinned with alcohol.
15. Have your work graded by your instructor.
16. Hand in your paper on "Wrought Iron."

Part IV. Wiring

Procedure:

1. Drill a $\frac{5}{16}$-in. hole through the standard near the bridge-arm attachment.
2. Drill a ¼-in. hole in the bridge arm directly over the end scroll.
3. Drill a ¼-in. hole in the bridge-arm scroll directly under the last hole.
4. Fit a special nipple in the hole drilled into the scroll of the bridge arm.
5. Solder the nipple in place with a Bunsen burner.
6. Cut a length of electric cord to reach from the floor to the bridge arm plus the length of the bridge arm.
7. Attach one end of the cord to the push socket.
8. Run the cord through the holes in the bridge arm. Screw the socket to the nipple.
9. Run the cord through the hole in the standard to the floor.
10. Attach a split plug to the end of the cord.
11. Connect the plug to the extension cord. Put in the light bulb. Test.
12. Have your work checked by your instructor.
13. Make a charge for all of the material used in wiring the lamp.

SHEET-METAL WORK AT THE CENTRAL CONTINUATION SCHOOL, BUFFALO, NEW YORK
PHOTO BY HIRAM E. GREINER

PROBLEMS & PROJECTS

This department aims to present a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in woodworking, turning, patternmaking, machine-shop practice, sheet-metal work, forging, foundry work, auto mechanics, auto electricity, electricity, architectural and mechanical drafting, printing, bookbinding, concrete work, farm mechanics, home mechanics, and other lines of industrial-arts work are desired for consideration.

A DESK CALENDAR HOLDER

P. D. Derby and W. A. DeVette, Wilson Junior High School, Erie, Pa.

(See Supplement No. 112)

The accompanying illustration shows a desk calendar holder which can be made by beginning students in the general shop. It involves the several elementary operations listed below, together with the tools required for each.

The dimensions given are for the celluloid calendars often given out as advertising by technical-supply companies, but they may be changed to suit the size of any available calendar.

List of Operations and Equipment

Equipment	*Operations*
Pattern and scratch awl.	Lay out work on metal.
Tin snips.	Cut out metal.
Folding machine; mallet.	Fold edges A, B, and C.
Brake.	Form metal at D.
Iron pipe; vise.	Form metal at E.

Procedure

In making the calendar holder, first lay the pattern on a piece of IC bright tin and mark around it with a scratch awl. Next cut out the metal with the tin snips. After the metal has been cut out according to the pattern, set the gauge on the folding machine to the same width as the dimensions marked on the edges A, B, and C, and then fold over the edges A and C. Now fold edge B so as to cover the ends of the folded edges A and C. In the next operation, place the holder in the brake so that the middle is along the edge of the clamping bar with the folded edges outside and facing downward. Then raise the bending leaf and bend the metal to take the position as shown in the drawing at the point D. By using a piece of iron pipe held in a vise, and a mallet, form the end of the back of the calendar holder as shown at E.

SHEET-METAL PROBLEM

Harry W. Kroll, Martin Hughes High School, Buhl, Minn.

(See Supplements Nos. 113 and 114)

The incentive for good work in any classroom may often be given by discussing a future piece of worth-while work at the beginning of the course. The problem of the chicken nests described herewith proved to be such an incentive in the author's sheet-metal class. Accuracy, neatness, and the economy of time were emphasized in the working out of elementary problems. These problems involved practice in machine operations, such as the use of the bar folder, groover, wiring machine, cornice brake, and the like, and preceded the work on the construction of the nests.

The details in the construction of the nests may vary, as no set rule can be laid down, except that economy of material, strength, appearance, and usefulness, are the essentials to be considered.

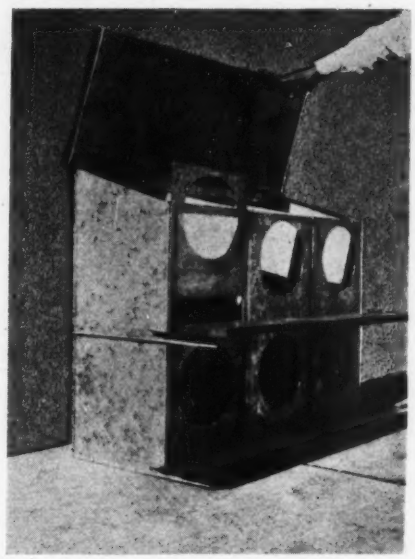
The method of construction makes it a very desirable type of nest, because it may be cleaned by pulling up the front, and it is entirely vermin-proof.

Construction

1. All material is cut from No. 20 and No. 26 galvanized iron. Broken lines in the patterns indicate the position of folds. It requires the use of 24 $\frac{3}{8}$ by ¼-in r.h. stove bolts. If the same kind of bolts are used as fasteners on the jumping rest, four $\frac{3}{8}$ by 1-in. f.h. stove bolts are required.

2. *Back.* Lay out and cut the back to the dimensions shown in Figure 1. Cut the openings for one leaf of the hinge 4¼ in. from either end as shown in the drawing. Use a cold chisel for this. The top also may be fastened by riveting the hinge between the cover and back, or a slot may be cut for the hinge, in back and cover as shown in section M, Figure 3. Fold the back in the cornice brake and complete the bends, using a mallet and a stake. The fold on the top edge of the back is bent to conform to the angle of the cut on the top edge of the end pieces and may be secured more accurately after the end pieces have been completed. Refer to Sections G and J, Figure 3, for the folding of the back. Holes may be punched at desirable distances from both ends near the upper edge of the back, so that the nests may be fastened with screws to the studding in the henhouse. The weight of the nests should rest on wall brackets, the screws near the upper edge merely adding stability.

3. *Ends.* Lay out and cut the end pieces to the required dimensions, as shown in Figure 2. Fold them to the proper shape on the cornice brake. The folds of the end pieces are shown in Sections H and K, Figure 3. First fold the ¼-in. closed hem on the bottom toward the inside of the end piece. Then form the slot into which the nest doors fit as shown in section H. Fold in at right angles the ¾-in. material at the top edge of the end, and the remaining ¾-in. material at the bottom to a right angle in the same direction. Be certain to fold one piece for the right and one for the left end of the nests. Slip the ends into the slots formed on the back as shown in the perspective drawing, Figure 4, and in Section K, Figure 3. Drill a hole ¼ in. from the bottom, as shown in Section K, Figure 3, through the folds and the end piece. Measure ¼ in. down from the top, as shown in Section G, Figure 3, and drill a hole through the folds and the end piece and fasten these together with stove bolts. Do the same at the other end.



THE COMPLETED CHICKEN NEST

4. *Crosspieces.* Lay out and cut crosspieces F, Figure 1, using No. 20 galvanized iron. Fold to conform to the required shape as shown in Figure 1. After folding the ¼-in. hem, the proper angle for bending may again be secured from the end pieces. The ends of pieces F fit under the ¾-in. fold at the top of the end piece as shown in section H, Figure 3, and section B, Figure 1. Drill a hole and fasten with a stove bolt.

Lay out and cut the bottom crosspiece G shown in Figure 1. Bend it to shape on the brake. Piece G is placed in position as shown in Figure 4, with the ends resting on the ¾-in. material turned at right angles to the end piece. Drill a hole, first through piece G and then through the ¾-in. lap on the end piece and fasten with a stove bolt. Do the same at the other end.

5. *Front Uprights.* Lay out and cut the two front uprights to the dimensions shown in Figure 2. Before folding, cut on the lines indicated, with snips ¾ in. in as shown. Proceed to fold on the brake as shown in section E, Figure 2. Do not squeeze the folds together too tightly or the doors will not slip up and down easily. The cut on both ends of the uprights will allow crosspieces F and G to slip in

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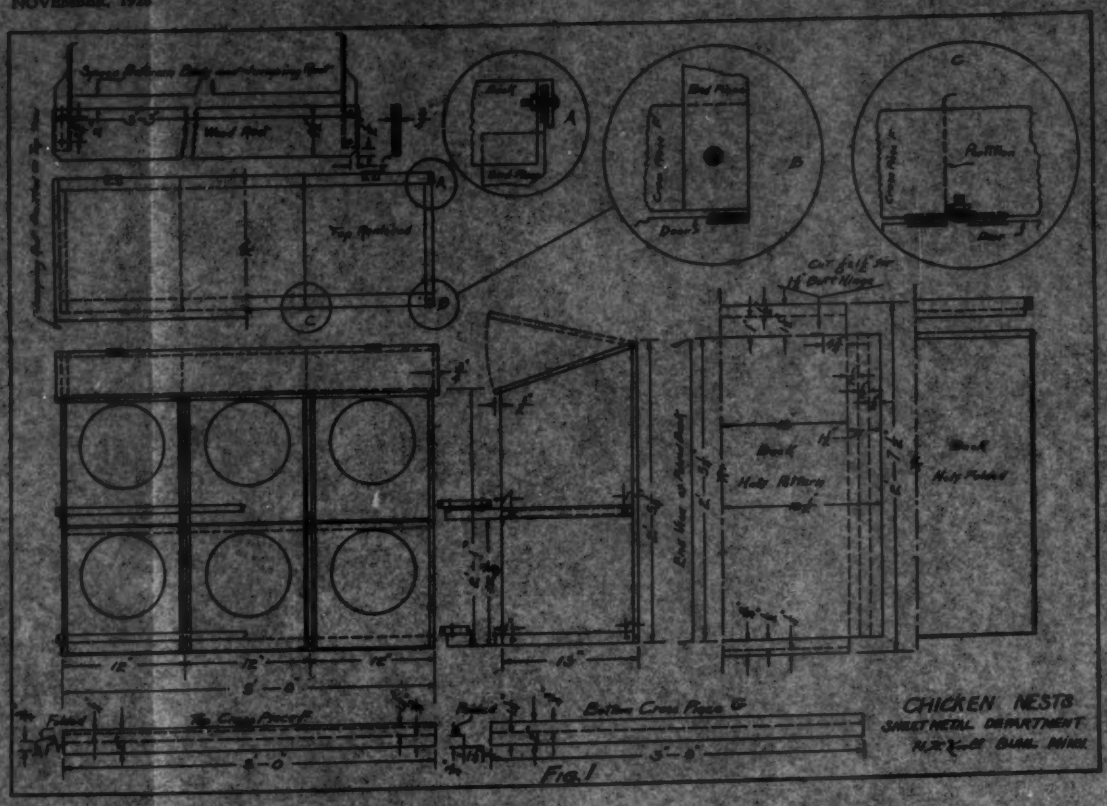

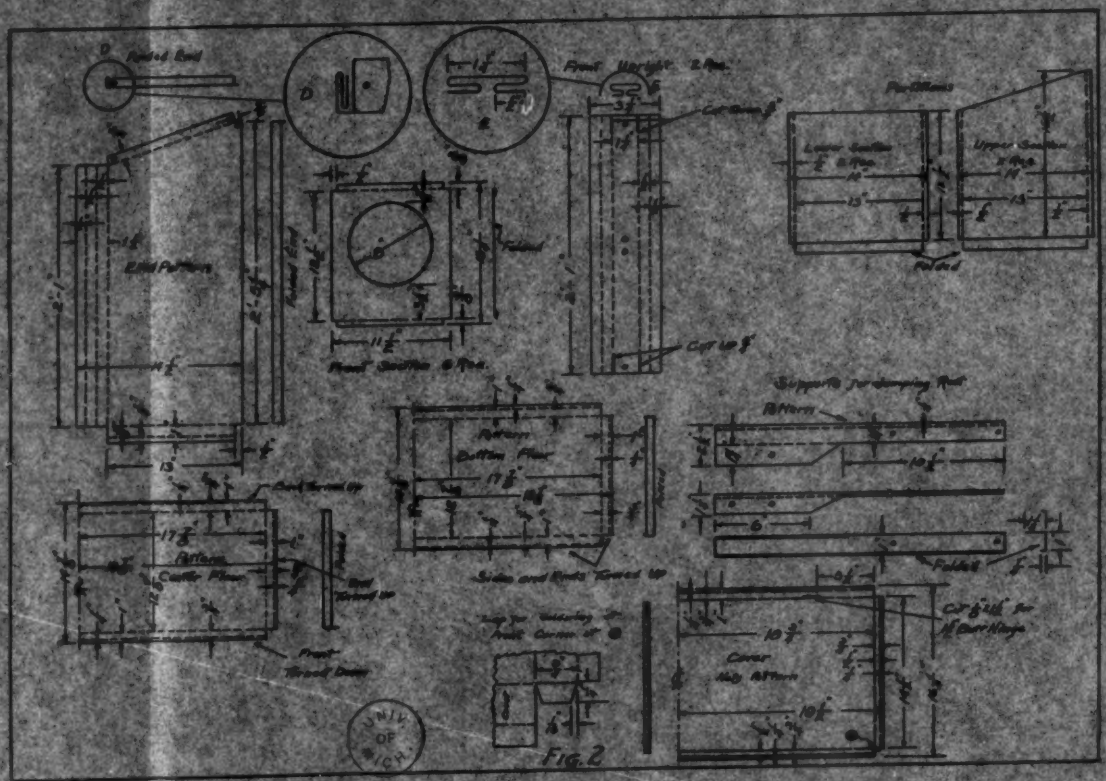

Chicken Nest, Designed by Harry W. Kroll, Buhl, Minn.

For Description See Page 402, Industrial Arts Magazine, November, 1928.

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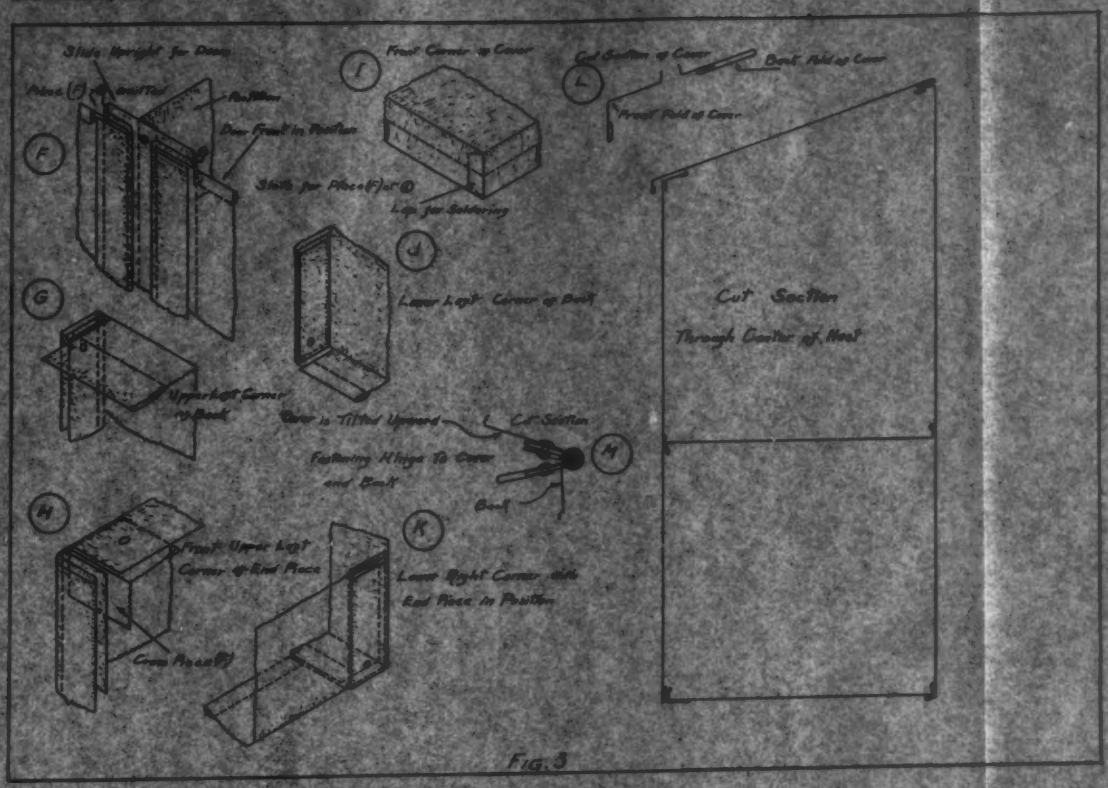
Slide Upright for Door
Place (F) on Position
Position
Door Front in Position
Front Corner of Cover
Cut Section of Cover
Back Fold of Cover
Front Fold of Cover
Skids for Piece (F) at (I)
Lug for Soldering
Lower Left Corner of Back
Cut Section
Through Center of Roof
Upper Left Corner of Back
Door is Tilted Upward
Cut Section
Fastening Hinge To Cover and Back
Hinge
Front Upper Left Corner of End Piece
Lower Right Corner with End Piece in Position
Cross Piece (F)

FIG. 3

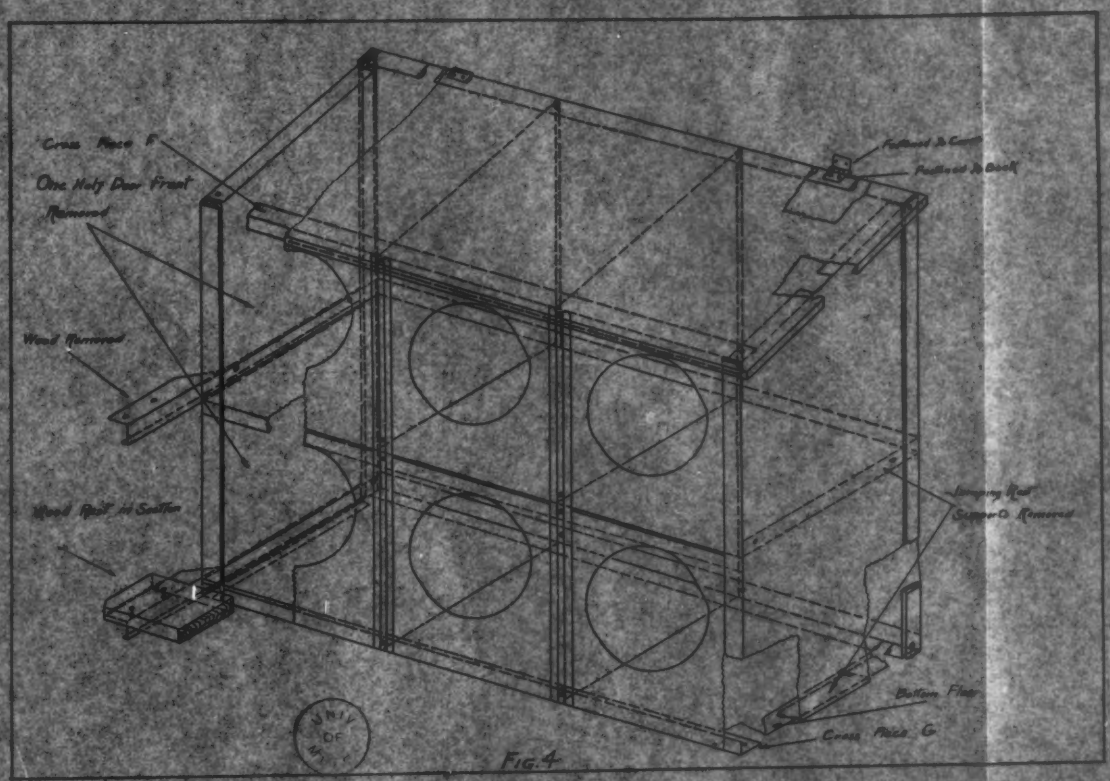

FIG. 4

Chicken Nest, Designed by Harry W. Krell, Buhl, Minn.

For Description See Page 402, Industrial-Arts Magazine, November, 1928.

TRACING SUPPLEMENT No. 115.
THE INDUSTRIAL-ARTS MAGAZINE,
NOVEMBER, 1928

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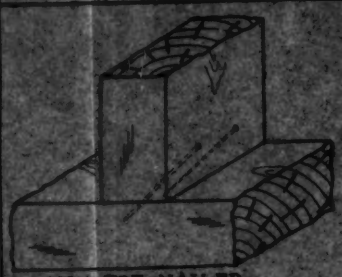
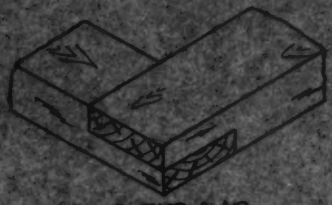
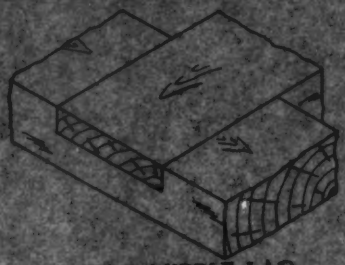
— CARPENTRY JOINTS —



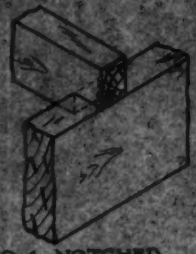
NO. 1- TOE-NAILED
House framing



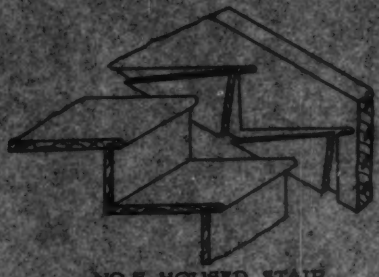
NO. 2- END LAP
Sills



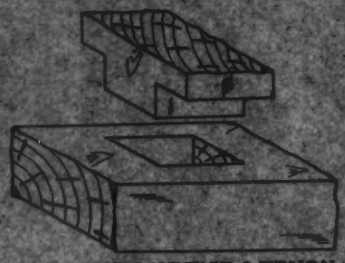
NO. 3- MIDDLE LAP
Floor timbers



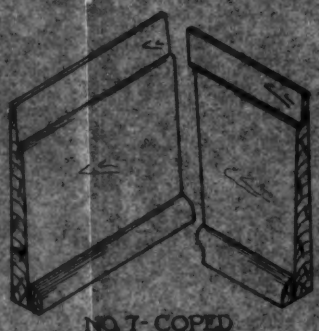
NO. 4- NOTCHED
Joist to wall plate



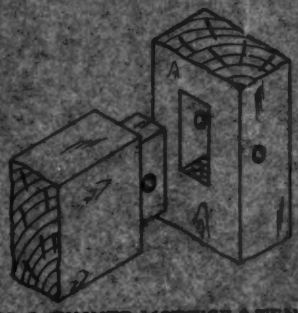
NO. 5- HOUSED STAIR
Stairs



NO. 6- STUB MORTISE & TENON
Heavy framing

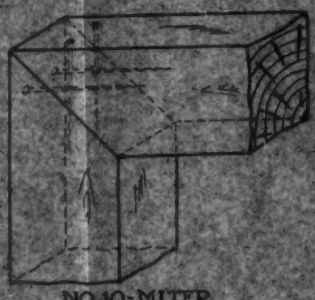


NO. 7- COPED
Baseboard corner



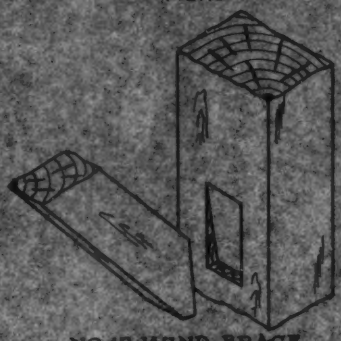
NO. 8- PINNED MORTISE & TENON
Heavy framing

NO. 9- NOTCHED
Rails

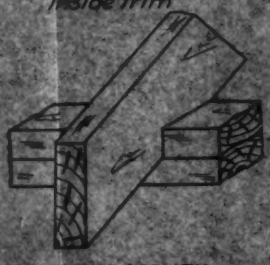


NO. 10- MITER
Inside trim

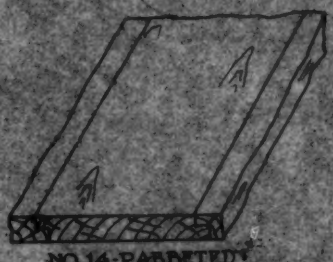
NO. 11- BRACE
Braces



NO. 12- WIND BRACE
Braces (shouldered)



NO. 13- BIRDS MOUTH
Rafters



NO. 14- RABBETED
Shiplap sheathing, Doors, Windows

NO. 15- MATCHED
Flooring

Designed by John F. Faber and Jaroslaw Bright, Esq., Pa.

For Details See Page 403, Industrial-Arts Magazine, November, 1928

U. OF MICH.

TRACING SUPPLEMENT No. 112.
THE INDUSTRIAL-ARTS MAGAZINE.
NOVEMBER, 1928

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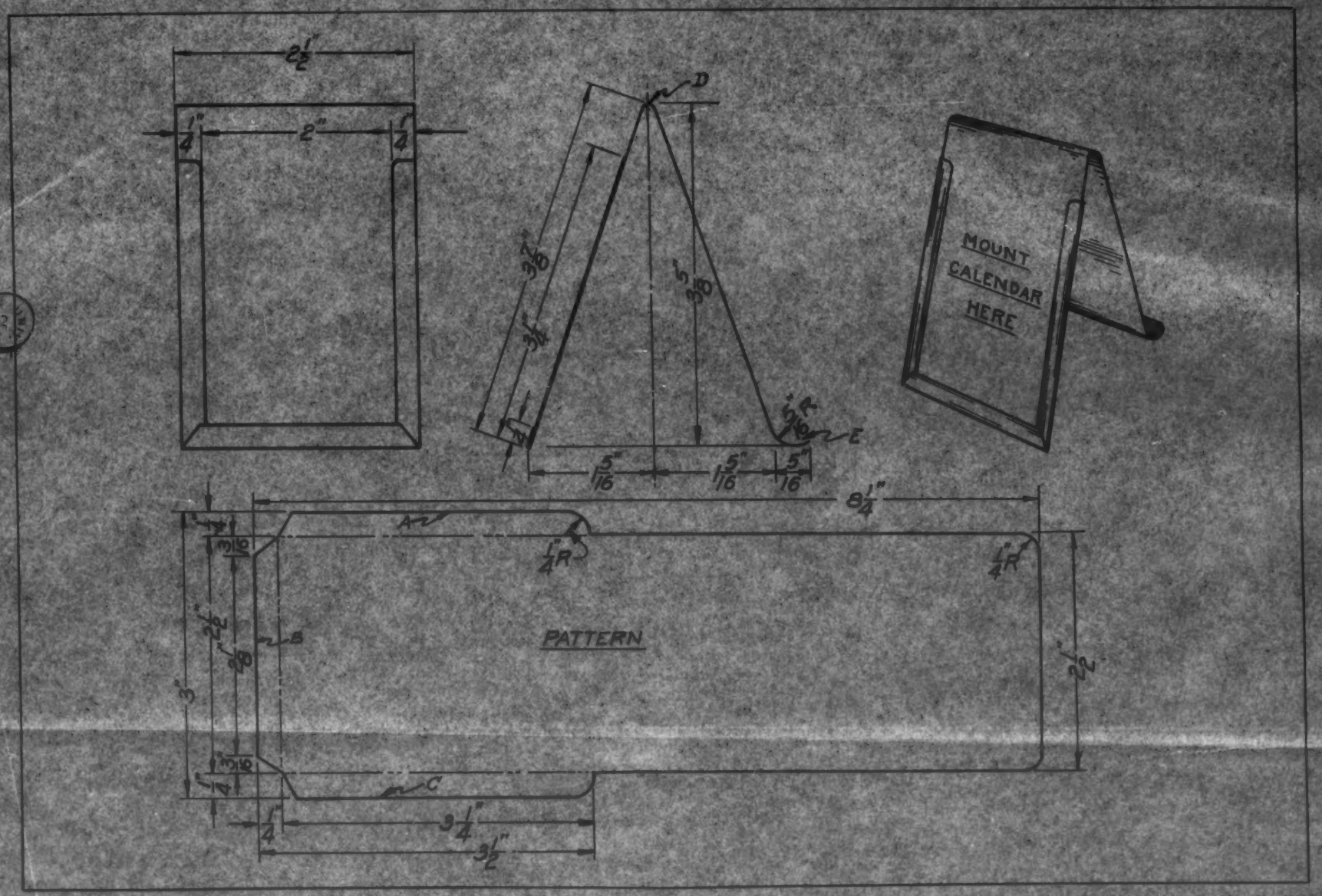


Desk Calendar Holder, Designed by P. D. Derby and W. A. De Vetta, Erie, Pa.

For Details See Page 402, Industrial-Arts Magazine, November, 1928.

the slots, thereby holding the uprights in place, as shown in section C, Figure 1, and section F, Figure 3. In section F the position of the upright is shown, but with crosspiece F removed. The slots into which the crosspiece F fits are shown at xx. Drill a hole through crosspiece F and the upright, ⅜ in. from the upper end and fasten with a stove bolt. Measure ⅜ in. from the bottom of the upright, drill a hole through the upright and the crosspiece G, and fasten with a stove bolt. Do the same with the other crosspiece.

6. *Bottom Floor.* Lay out and cut the bottom floor to the dimensions shown in Figure 2. Form a ¼-in. closed hem on all sides. Bend up the sides and the ends on the brake with the ¼-in. hems on the inside. The cross section of the whole nests in Figure 4, shows the bottom in place. Remove the bolts from under the bottom of the nests and drop the bottom floor in place. Holes may be drilled through the ¾-in. lap turned up at right angles at the bottom of the end pieces and at the front uprights. A block of wood held on the inside of the nests where the hole is to be drilled will assist in drilling these holes.

7. *Center Floor.* Lay out and cut the center floor to the dimensions shown in Figure 2. Fold a ¼-in. closed hem, in the same direction, on one side and on the two ends. Fold the ¼-in. closed hem on the remaining side in the opposite direction. Bend the two ends and one side, having the hem turned in the same direction, up at right angles, with the hems on the inside. The remaining side is now turned in the opposite direction, with the hem on the inside. Drop the center floor in place, with the one side turned down, at the front of the nests. A hole is drilled, 1 in. from each end, as shown on the end view of the nests in Figure 1. The hole will pass through the ¾-in turned-up lap at the ends of the center floor. Use bolts for fastening the floor in place. The ¾-in. lap on the center floor is turned down to facilitate the cleaning of the nests when the doors are pulled up.

8. *Nest Doors.* Lay out and cut the doors to the required dimensions. Turn a ⅜-in. closed hem at both ends. The 8-in. hole may be cut with circular snips or power shears. Slip the doors into the slots provided for them on the ends of the nests and on the uprights, as shown in sections B, C, Figure 1, and section F, Figure 3.

9. *Partitions.* Lay out and cut partitions to the dimensions shown in Figure 2. Bend the ½-in. lap on the sides of the partitions to right angles. Put the lower partitions in place. Measure ¼ in. below the center of the upright and drill a hole through the upright, center the floor and ¾-in. lap on partition. The approximate location of the hole is shown in the front view of the nests, Figure 1. The lower end of the partition is held in place by a bolt which passes through the upright, crosspiece G, and bottom floor. The back of the partition is held in place with bolts placed at the same distance from the floor through the back of the nests, as those passing through the front of the partition. The upper partitions are held in place by stove bolts passing through the uprights, ¼ in. above the center floor, and at the upper end by the bolt which holds the upright and the top crosspiece in place. Their relative position may be seen in the perspective view of the nests in Figure 4. The backs of the upper partitions are held in place by bolts passing through the partitions and the back, ¼ in. from the upper and lower end of the partitions.

10. *Cover.* Lay out and cut the cover to the dimensions shown in Figure 2. If the hinge is placed between the folded material on the back of the cover, cut the required opening as shown. Fold a ¼-in. closed hem on all sides. On the back of the cover, fold the remaining ¾-in. material down to form another hem as shown in section L, Figure 3. Bend the remaining sides, with hems inside, down at right angles. A ¼-in. lap for soldering is made on the two front ends of the cover. Section I, shows the laps in position for soldering.

11. Slip the 1½-in. butt hinge in place; one leaf in the slot cut in the cover, and the other in the slot cut in the back of the nest. Rivet in place as shown in section M, Figure 3.

12. *Jumping-Rest Supports.* Use No. 20 galvanized iron for the jumping-rest supports. Lay out and cut to the dimensions shown in figure 2. Bend as indicated in the drawing. Drill two holes in each piece for fastening the wood rest in place as shown in the drawing of wood rest and supports in Figure 1. Fasten the supports in place with the bolts which hold the bottom and center floors in position, as shown Figure 4.

13. Construct the wood rest to the dimensions given in Figure 1. Leave in natural wood without finish. Fasten with screws through holes in supports or use 1-in. stove bolts as fasteners. Go over the rest and see that all bolts are properly fastened, and that all doors slide smoothly.

CARPENTRY JOINTS

John F. Faber and Jonathan Bright, Erie, Pa.

(See Supplement No. 115)

Supplement No. 115 shows a compilation of the most common joints with which the carpenter must be familiar. This group of joints may therefore be of interest to those schools where carpentry or advanced woodwork is taught.

The uses of each joint also are indicated.

WROUGHT-IRON SMOKING STAND

Raymond O. Fludder, Hamilton High School, Hamilton, Ohio

The wrought-iron smoking stand pictured here was one of several made in the forging class at Hamilton High School.

Several boys requested to make a smoking stand and were told to look through the instructor's scrapbook of photographs for ideas on the design of such projects, and then to submit a sketch of the stand which they wished to make. The student's sketch was then criticized, after which he was required to make a full-size drawing of his design.

His full-size layout was used as a template, thus avoiding the making of special scroll templates.

This project kept the boys busy many weeks and they never lost interest in their work. After the stand was finished, it was taken home with great pleasure, and presented to dad.

A DIFFERENT TILT-TOP TABLE

Robert A. Hardin, Nebraska Wesleyan University, University Place, Nebr.

The accompanying illustrations show a novel and practical tilt-top table. This chess table was designed for use in a den, but it was such a success that it has always been used as a part of the living-room furniture.

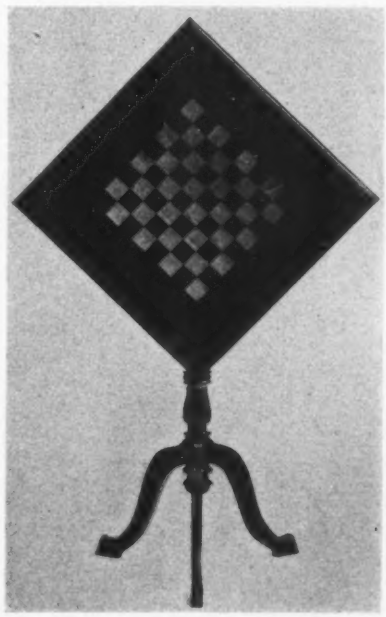


FIG. 1

This problem may be worked out by a third- or fourth-year student. The only machinery absolutely necessary is a lathe and a saw with a dado attachment. The milling around the edge may be done

at a local planing mill, or it may be done by hand. The wood used was walnut, with the chessboard made up of curly maple and walnut, bordered with ebony.

Figure 2 shows the best method of constructing the table top. Four strips of walnut 1 by 1½ by 15 in. are glued up alternately with four strips of maple of the same size, using a spline joint. The reader will observe that the strips are 3 in. longer than the board. This is done to allow for cutting and sizing. The glued-up piece is then sawed across the grain into six strips, each strip being 1½ in. wide, and two strips, 1⅜ in. wide. The two wide strips are used on the outside to allow for the final dressing down on the edges of the board. Accuracy in sizing is absolutely necessary for perfect fits at the corners of the squares. Every alternate strip is next turned around and glued up with a spline joint, thus completing the chessboard. Perhaps only half of the board should be glued at a time, because care must be taken to properly match the corners of the squares.

After gluing on the ebony border, the end pieces of the top, C and D, are glued to the board, using a spline joint. The pieces on the sides, E and F, should be doweled unless the student has access to a shaper for cutting a tongue and groove.

The construction details for the hinge joint and pedestal, are shown in Figure 3 which is taken from a tilt-top table designed by A. E. Bidney, Milwaukee, Wis., which appeared on page 114 of the March, 1925, issue of the INDUSTRIAL-ARTS MAGAZINE. Perhaps the best way for cutting the feet is to plot the curves on a thin board, and use that

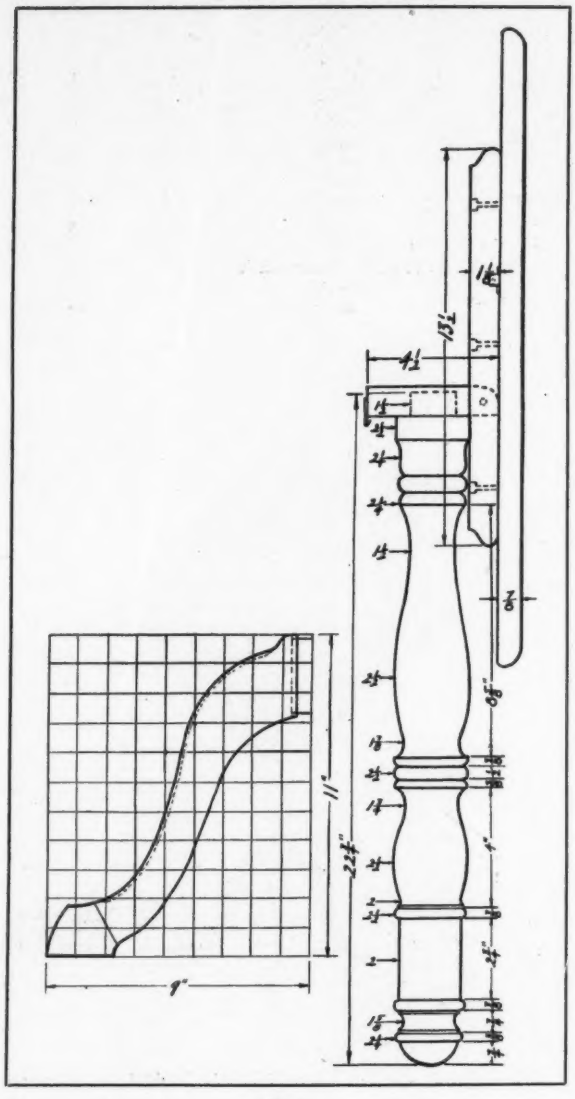


Fig. 3

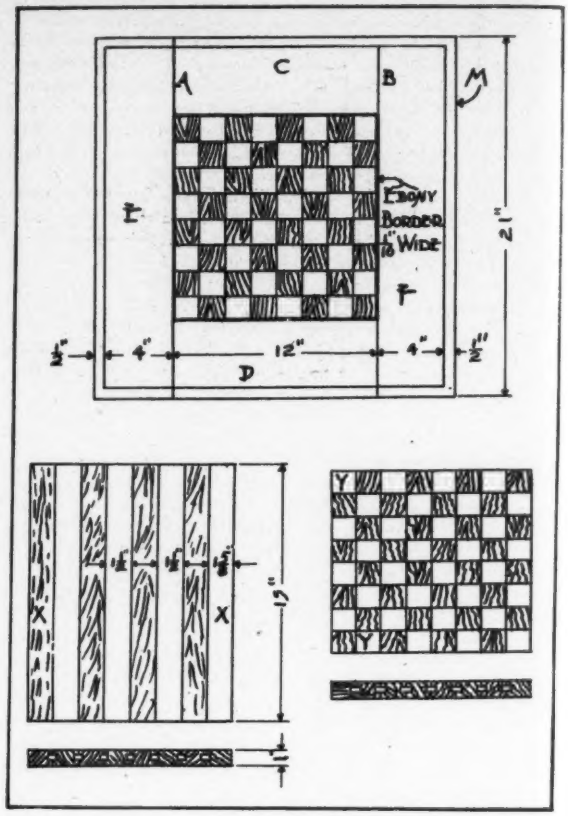


FIG. 2

as a template. A great deal of originality may be shown in the design of the pedestal and feet. A study of the designs that are contained in "Reproductions of Antique Furniture" by H. Hjorth, published by The Bruce Publishing Company, may assist in arriving at a pleasing solution of this design problem.

MAKING ELECTRIC MOTORS IN SCHOOL

Geo. A. Willoughby, Ann Arbor, Mich.

Teachers of practical electrical work will be interested in the motor described in this article. It is difficult to find an electric motor which can be constructed by students and which is entirely satisfactory, yet low in price. If motors are too small, pupils often find them rather difficult to make, and the value of such a motor after it has been constructed is rather limited.

During the latter part of last year, one of my students was set to work on this problem and the result which he achieved has been very satisfactory. The boy with the motor parts ready for assembling is shown in Figure 1, and the completed motor is shown in Figure 2. No doubt, improvements can be made in the outward appearance of the motor but its operation from the electrical standpoint is exceptionally satisfactory and the motor is now being used to operate workshop machinery in the home.

In Figure 3 are shown the rotor and stator laminations for the machine, which, together with the copper discs for the ends of the rotor and the copper bars for the slots, were purchased by the pound from a well-known manufacturer of electric motors. With these materials as a basis, we started to build a motor which would serve well for both educational and practical purposes. The details shown in Figures 4, 5, 6, and 7, furnish sufficient data for the construction of a motor of the same size, or about the same size.

The simple ends or brackets shown in Figure 4 were drawn up and a pattern was made in the pattern shop. The castings were then made in the foundry.

The stator core was made up of ninety laminations as shown in Figure 5, placed on ⅜-in. rods sufficiently long to receive the end brackets and the nuts which hold the brackets in place.

The rotor (Fig. 6) consists of laminations pressed on a shaft, which was turned on a lathe. These laminations are held together by

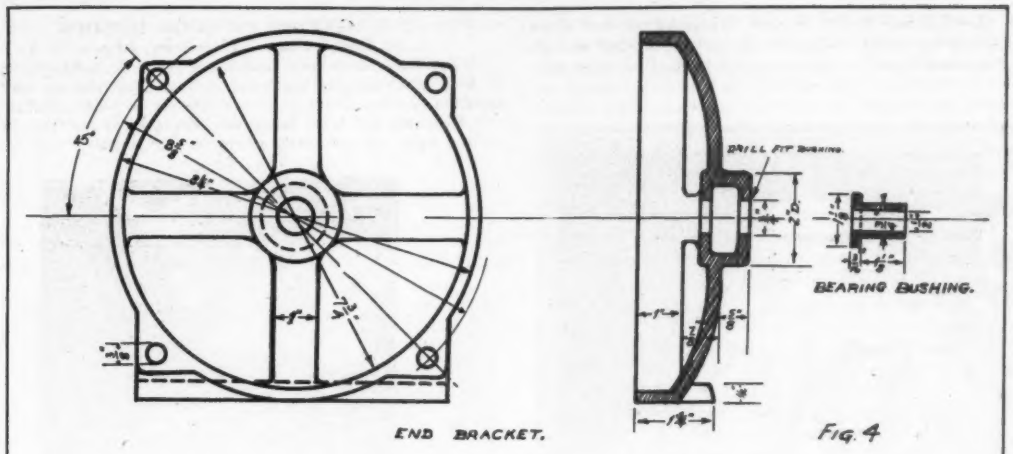


FIG. 4

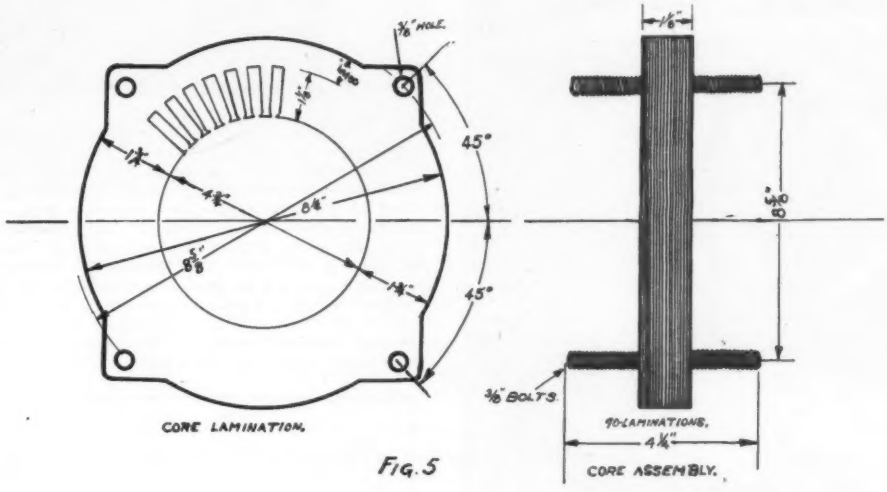


FIG. 5

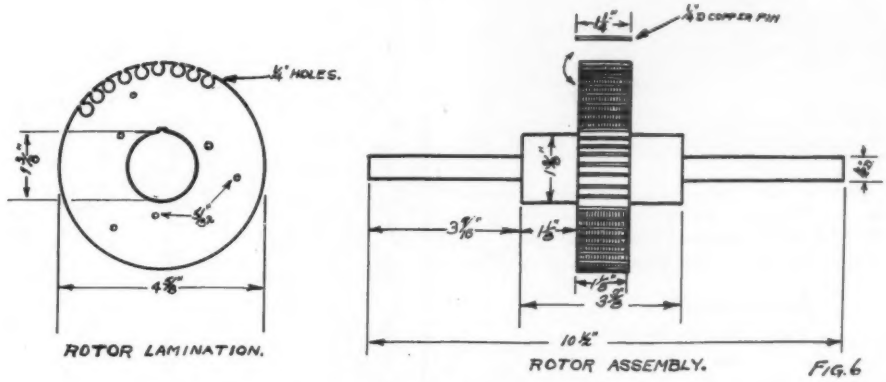


FIG. 6

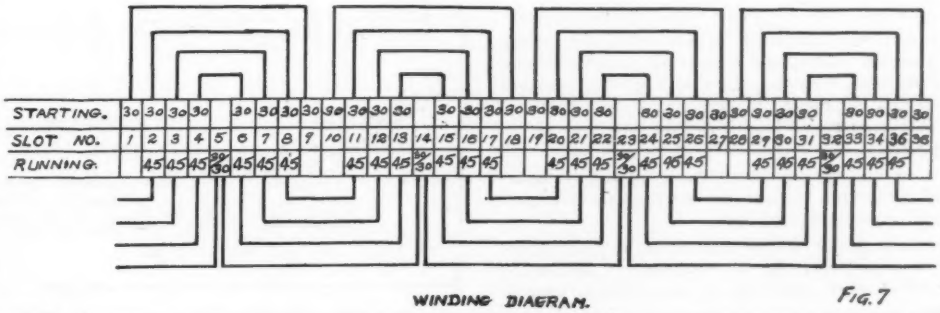


FIG. 7

ELECTRIC MOTOR DESIGNED BY GEO. A. WILLOUGHBY, ANN ARBOR, MICH.

copper discs placed on each side of the core. These are the same shape as the laminations but thicker. Copper rods are then pushed through holes in the core and riveted on each side, thus holding the rotor parts together.

The winding which we used, more or less empirically, is shown in the winding diagram. This particular winding worked quite satisfactorily but a different winding arrangement might be devised.

The following data gives all the information required to finish the winding.

Winding Data

Type, Split Phase. *No. of Slots,* 36.

Speed, 1800 r.p.m. *No. of Poles,* 4.

Wire for Starting Winding, No. 22 single cotton enameled (S.C.E.)

Wire for Running Winding, No. 19 single cotton enameled (S.C.E.)

Large flexible wires were soldered to the ends of both the running winding and the starting winding and brought out through holes in the frame. A push button connected in the starting circuit was used in starting but opened the starting winding circuit automatically as soon as the pressure was removed from it and the motor ran on the running winding alone.

When the motor was connected to a 110-volt line and the button pressed, it started quickly and ran smoothly and has since been given thorough tests and found to be satisfactory.

As stated in the beginning, this was more or less of an experiment but the results are so satisfying that the information is fundamental in the development of great possibilities in practical motor construction at a low cost.

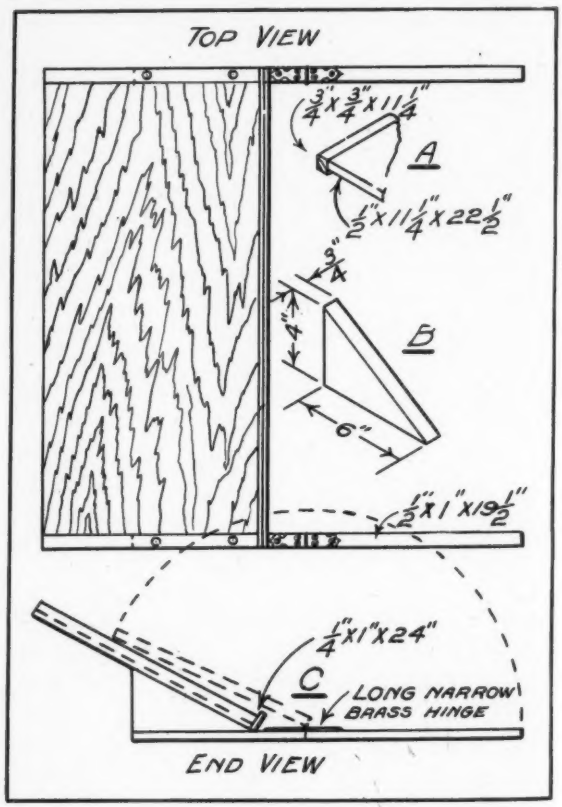
MAGAZINE OR BOOK HOLDER

L. M. Roehl, Cornell University, Ithaca, N. Y.

The magazine or book holder is a device for holding a magazine or book at a desirable angle and distance from the eye for reading comfortably while sitting in a rocking chair or other armchair.

Basswood has been found very desirable to use for the holder as it is light, yet sufficiently strong for the purpose.

The shelf is made of a piece of material ½ by 11½ by 22½ in., which is held flat by a strip ¾ by ¾ by 11½ in., which is nailed to each end as shown in detail sketch A. The magazine or book is held from slipping off the holder by a ¼ by 1 by 24-in. piece which is nailed to the lower edge. Two triangular blocks are made to the dimensions shown in detail sketch B. These blocks are fastened to the under side of the shelf at each end with light flat-head screws with the points of the blocks at the lower edge of the shelf. Two pieces of material, ½ by 1 by 19½ in. are nailed to the lower edges of the triangular blocks and serve as supports for the holder to rest on the arms of the chair. The two rests are cut in two at points 9 in. from the shelf end, and long narrow brass hinges are placed as shown at C in the end view. The hinges allow the rests to be folded as shown



MAGAZINE OR BOOK HOLDER

by the dotted line and greatly facilitate storage of the holder while not in use.

It is suggested that the one making the holder, should measure the distance between the centers of the arms of the chair on which the holder is to be used, and change the length of the shelf if necessary.

The holder may be finished by giving it a wood stain and then waxing it or by staining and varnishing.

SHEET-METAL LAMP

L. M. Klinefelter, Ruffner Junior High School, Norfolk, Va.

This lamp was developed as a problem for the general metal shop in a junior high school. It involves a number of sheet-metal processes such as pattern drafting, cutting, bending, soldering and wiring, as well as painting, decorating, and electric wiring. The drawing is only suggestive, both as to design and size. The lamp may be made with any number of sides from three to eight or more, or it may be made round. The cost is low, and when well finished, the lamp is quite attractive. It may be fitted with a two- or three-light fixture or with single socket as desired. In finishing, the new brush-lacquer finishes are good. They dry quickly and produce a hard durable surface.

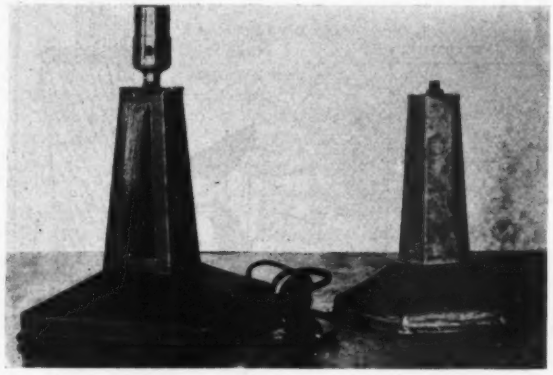


FIG. 1

Figure 1 shows the layout for a lamp with hexagon base. Figure 2 shows both the square and the hexagon shape.

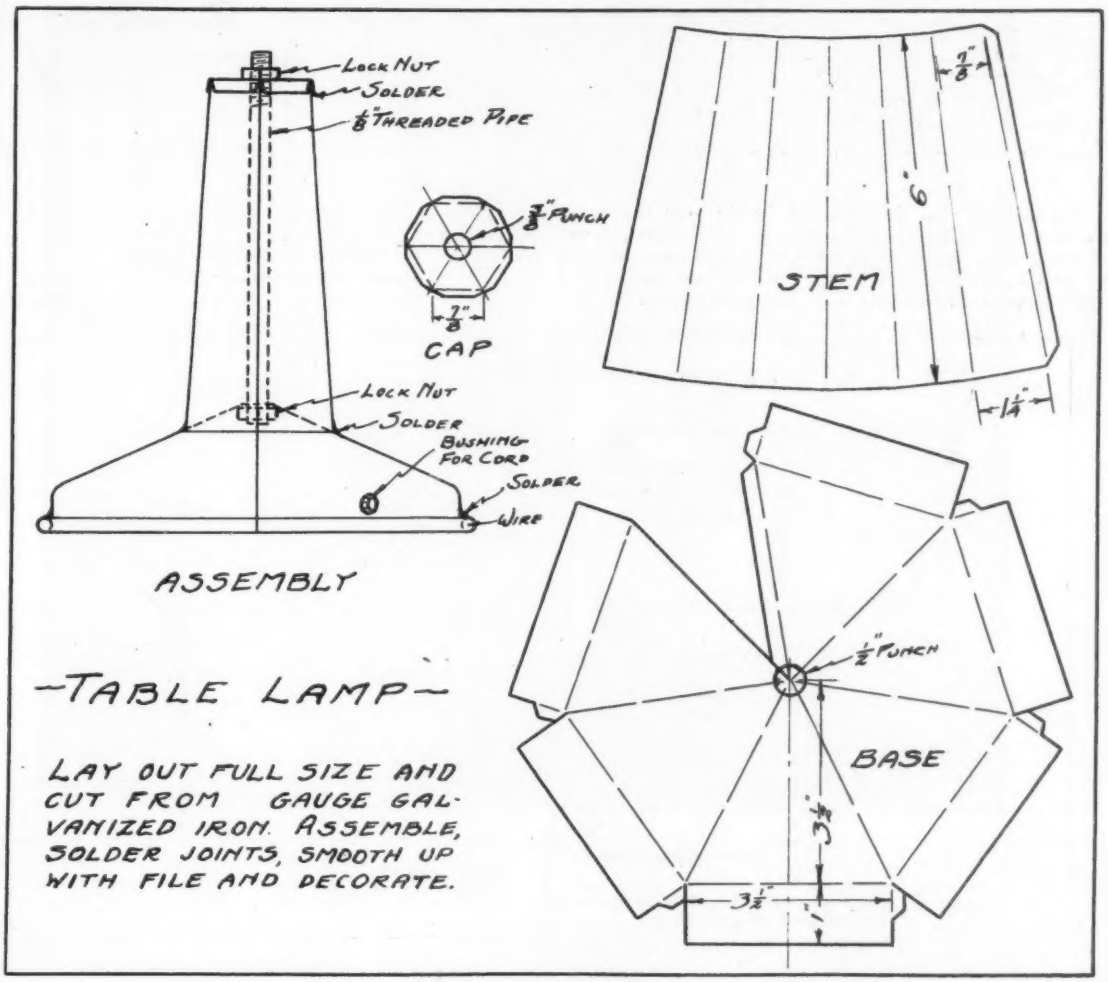
TELEPHONE CABINET

Kenneth R. LaVoy, William Nottingham Junior High School, Syracuse, New York

The accompanying illustration shows a telephone cabinet, which many boys will desire to make. The cabinet is designed to stand on the ordinary telephone table, and the small clock is added for decorative effect. The cabinet may be finished in any desired fashion. It may be stained and varnished, or it may be painted with one of the durable and attractive lacquers now in use.

Bill of Material

1 pc. 10	x 3	x 2 Curved Top
1 pc. 10	x 5	x ½ Top
1 pc. 12	x 8	x ⅜ Bottom
2 pc. 15	x 6½	x ½ Sides
1 pc. 15	x 9	x ½ or less Back
2 pc. 14½	x 1	x ½ Front Strips
1 pc. 8	x 2	x ½ Front Top Piece
1 pc. 12⅜	x 8⅛	x ½ Doors and Curved Pieces
1 pc. 6	x 9	x ½ Slide
1 pc. 10	x ½	x ½ Front of Slide
2 pc. 6	x ½	x ½ Strips to Hold Slide



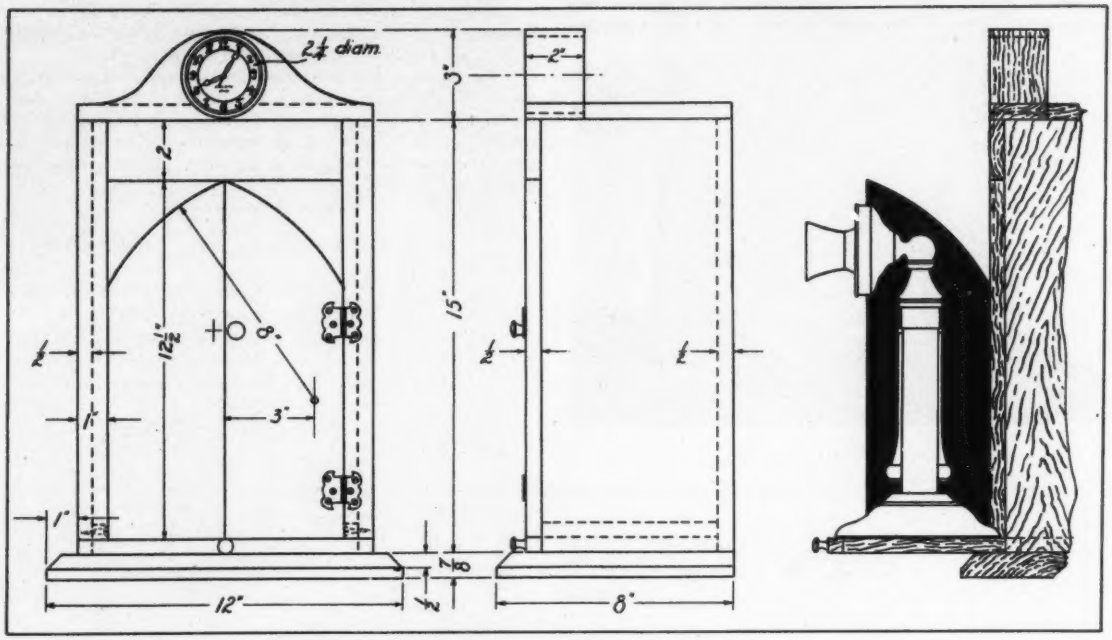
The construction calls for accurate workmanship, but is not intricate.

The doors of the cabinet open automatically when the slide on which the telephone rests is pulled out. This is made possible by placing two small buttons or "victrola" catches in the slide. These will hold the doors shut when the slide is in, but release the doors as the slide is drawn out.

The small clock used on this cabinet may be bought at a nominal sum.

The slide is built up of two pieces. For strength, the grain of these pieces should run from front to rear of the cabinet. To prevent any end-grain from showing in the front of the cabinet, a small strip 10 in. long and ½ in. square is glued or nailed to the front of the slide. The strips to hold the slide are 6 in. long and ½ in. square and are fastened with screws..

The design of the toppiece may be altered to suit the student's fancy. The opening for the clock is bored with an expansive bit, or it may be cut out with a turning saw.



TELEPHONE CABINET

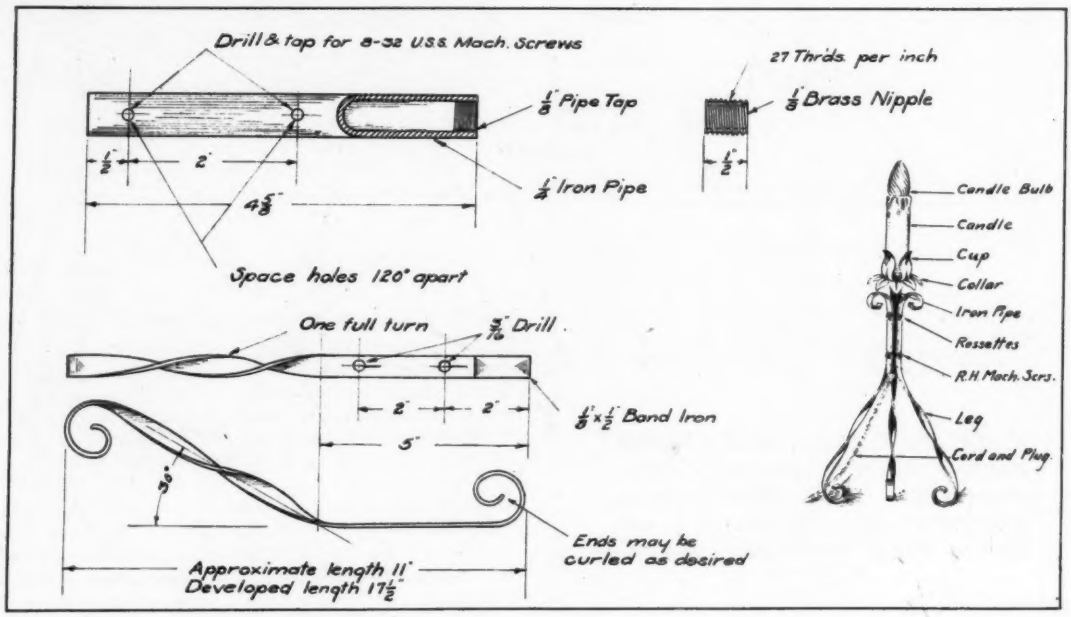
The stock list gives the dimensions for the doors and curved pieces as a single piece. These dimensions are ⅛ in. larger each way than the opening. Square up the board to the given dimensions, and then lay out the doors. When these are sawed out carefully and sanded, the doors and curved pieces will just fit the opening.

With this cabinet properly finished, the telephone ceases to form an obtrusive note in the harmony of the room.

ELECTRIC CANDLE LAMP

F. W. Barnett, High School, Piedmont, California

Among the wrought-iron articles made by the students of the



ELECTRIC CANDLE LAMP

junior high school, the electric candle lamp seems to be quite a favorite. The parts for this project can be purchased in large quantities making the cost of the lamp very reasonable. The local hardware or electrical dealer can usually furnish all the parts necessary to build it and variations may be introduced by using different cups, bending the legs to a different flare, using tear crystals, etc. Jigs may be used to take care of all the drilling, but they will be found necessary only for drilling the six holes in the pipe. The finished article can be lacquered in black, and gold may be dusted on the leaves and edges of the legs. Other ways of finishing the lamp will suggest themselves.

Bill of Material

1 pc. ⅛ x ½ x 17½	Band iron	Leg
1 pc. ¼ x 4⅜	Iron pipe	
6 ⅜ x 8-32	R.h. machine screws	
1 ⅛ x ½	Brass nipple	
1 6-in.	Lamp cord and plug.	
1 Candle with candelabra socket		
1 Candle bulb	1 Candle cup	
6 Rosettes	1 Collar	

VALVE TROUBLES

Ray F. Kuns, Cincinnati, Ohio

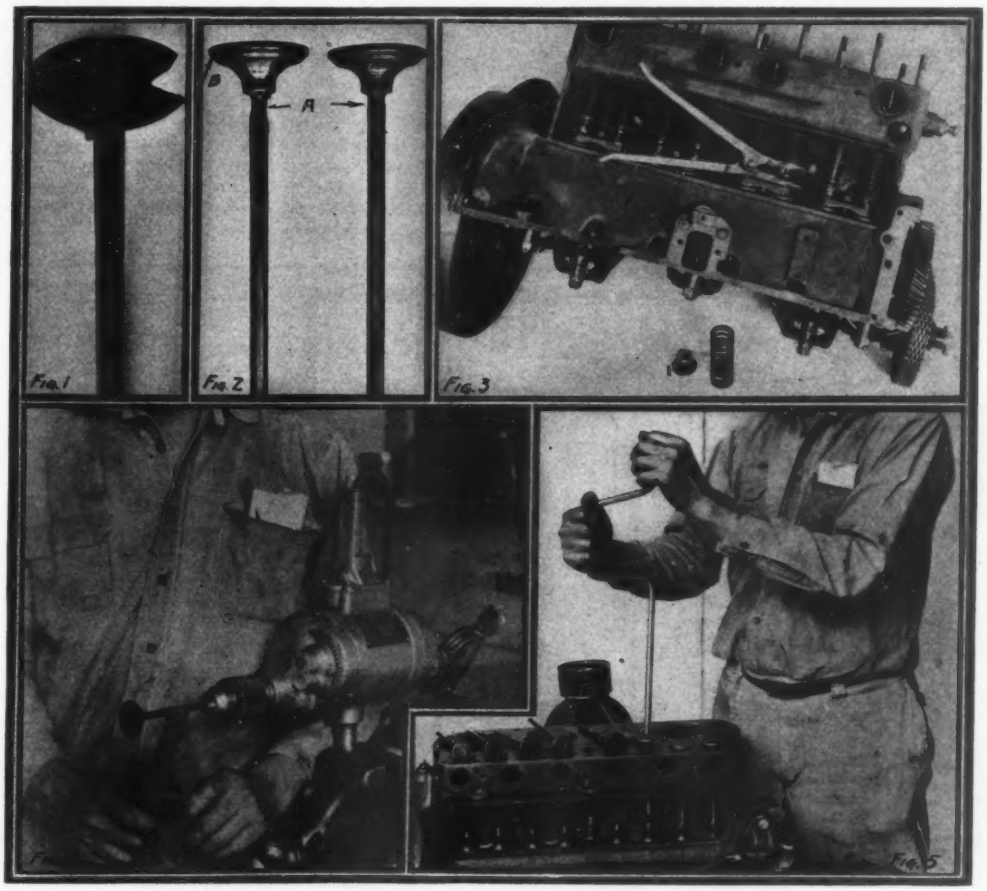
Sometimes they come sooner and sometimes later, these valve troubles. The valve appearing in Figure 1 has a piece of the head missing. This is a rather rare occurrence but it can happen, especially where the heads are made of cast iron. Strange as it may seem, the engine in which this valve was used would hit on six at high speeds but missed on three at low speeds. Exhaust gases would rush through the manifold and into the fifth cylinder through this break, and when the intake of this cylinder was open, would get into the intake manifold and disturb the mixture for the fourth, fifth and sixth cylinders, making the trouble difficult to locate. A badly warped valve or a valve which sticks will give the same trouble, because in both cases the valve will be held open.

The valves shown in Figure 2 are burned about the stem under the head. They are in about the right state to warp quickly and very badly. Sometimes the head itself is attacked and burned. The writer has seen valves taken from engines where a good portion of the head was missing entirely. Pitting of valves appears at the point indicated by the arrow at B in Figure 2. A ridge appears above and another below the pitted portion. Pitting occurs where the valve seats on the head or block.

Whatever the trouble with the valves, they must be removed and reconditioned. This is a comparatively easy job, which, if performed, with ordinary care, will usually be successfully accomplished. First, drain the water and then remove the cylinder head, then remove and clean the valves. Figure 4 shows a valve mounted in an electric drill for cleaning and polishing. The same thing may be accomplished using a hand drill or a bit brace instead of an electric drill. Cleaning by hand is just as well but it is not so quickly done. Many owners like to use a file to remove the pitting previously mentioned. This is done while the valve is held in the drill press or electric drill. As the valve turns, the file is placed firmly on the flat of the surface indicated by B, Figure 2, and given a firm, even stroke. Remove just enough metal to rid the valve face of the pitting and ridges.

Not all valves require refacing in this manner. They may be ground to a seat as shown in Figure 5. Use a valve-grinding tool to rotate the valve on its seat. The spring under the valve head is used to lift the valve which should never be rotated more than about half a turn back and forth a few times and then lifted by the light spring and a new position sought. Use medium grinding compound to start the work and then polish with a finer grade. Only a small amount is used at a time and this is applied with the finger to the valve face. Keep the valves in order and do not get them mixed during the grinding operation. Grind until a clean, true seat is obtained.

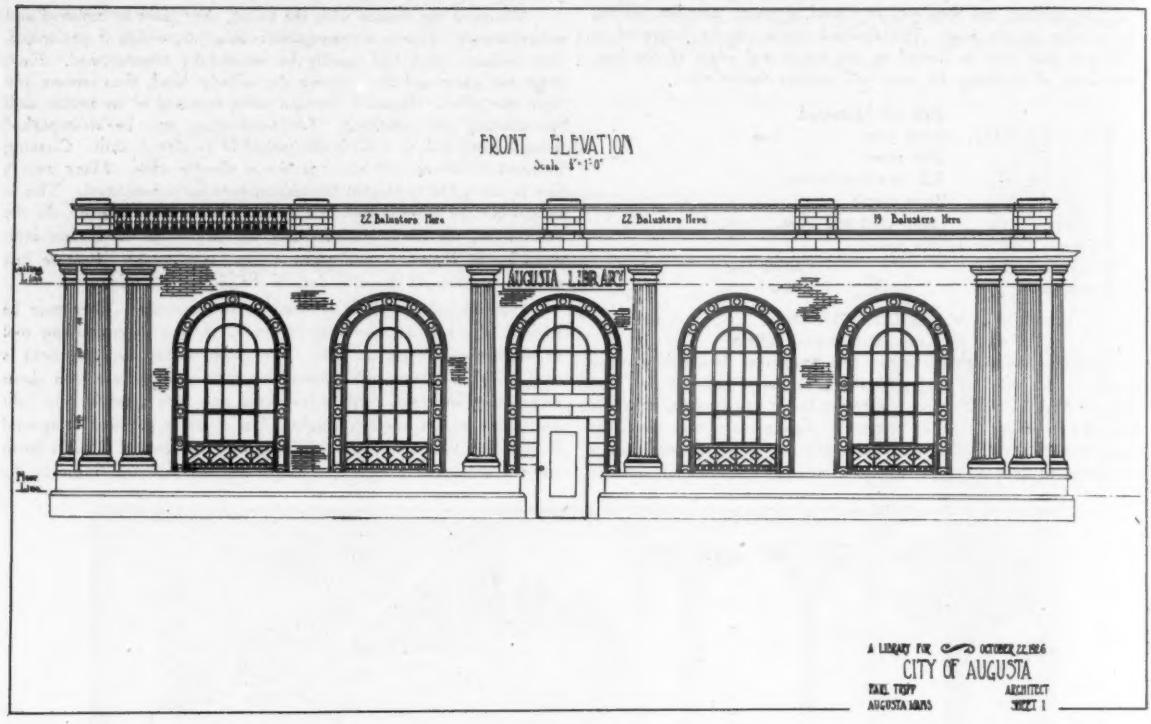
Some form of valve lifter must be used to remove and replace valves since the springs are very stiff. Figure 3 shows one form of valve-spring compresser in use. The spring is compressed and the pin pulled from the end of the valve stem. The tool is removed and the spring pulled from the valve guide, and the valve may then be lifted out.

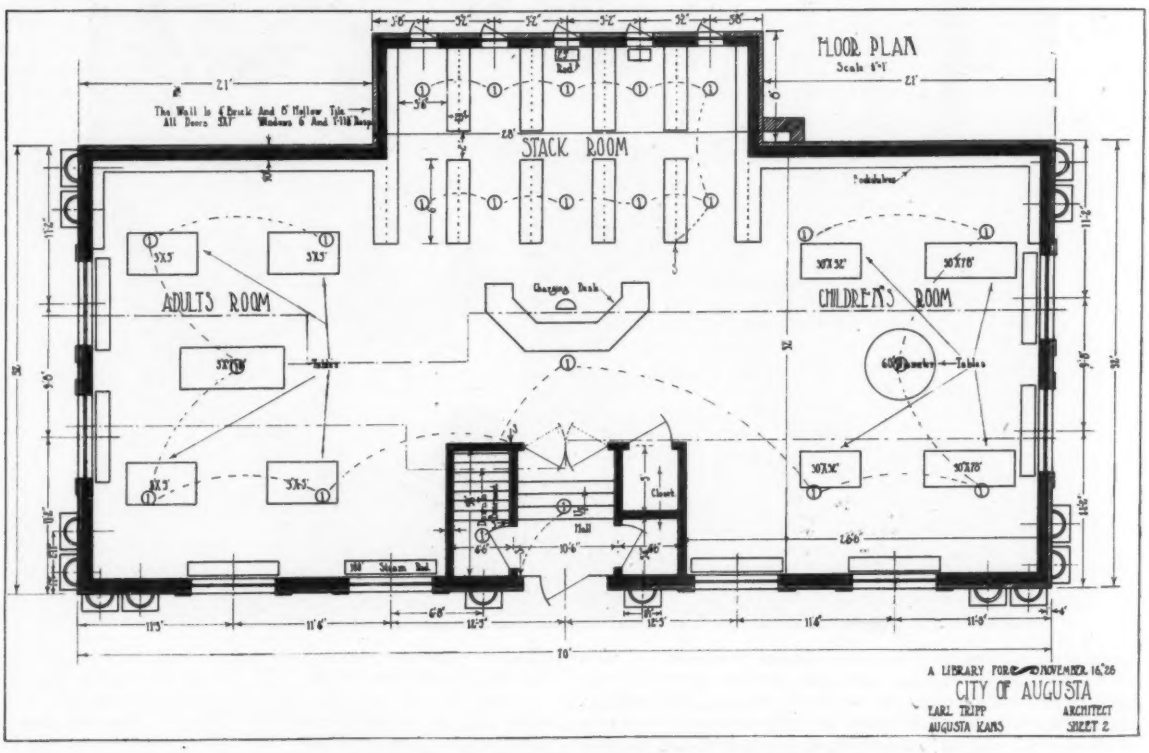


AN ARCHITECTURAL-DRAWING PROBLEM

H. H. Robinson, High School, Augusta, Kansas

In a high school where a large percentage of the boys take house or architectural drawing, probably a major number of these pupils will profit most from their study of the house, as future husbands and home owners rather than as architects. Any boy may profitably take at least one semester of house drawing. A good problem for the first semester's work would be the making of a complete set of plans, details, and specifications for a frame house. If this work is to be meaningful and applicable, it must be accompanied by a study of





SAMPLES OF WORK PRODUCED IN THE ARCHITECTURAL CLASS OF THE HIGH SCHOOL AT AUGUSTA, KANSAS, H. H. ROBINSON, INSTRUCTOR

materials, construction, etc. It may also be worth the while of most boys to take a second semester of house drawing, designing and making a complete set of plans and specifications for a brick, brick-veneer, or stone house.

Two semesters of house drawing, as suggested, would be all that would interest the greater number of high-school boys. However, there are those who are interested in architecture or building construction as a vocation, and who therefore wish to go further in drawing. There are many types of buildings that offer a good problem for those wishing to take more advanced work. The accompanying drawings are part of a set of plans for a small-city library. This problem constituted a semester's work for a boy who had previously taken two semesters of house drawing as suggested above. The drawings are the boy's own work in design, and resulted after considerable study of architectural material available in the drafting room, and after a consultation with the school librarian and others able to give valuable suggestions.

ELECTRIC HEATER

E. A. Rerucha, Wakefield Township School, Wakefield, Mich.

The electric heater shown in Figures 1 and 2 is being used by the writer as a project in the junior-high-school electrical classes.

A common tin washbasin, such as can be purchased at any hardware store is used to reflect the heat from the heating element. The heating element is mounted in a screw-ring sign receptacle which is attached to the reflector by punching a hole in the center of the washbasin through which the threaded nipple of the receptacle ring may be inserted, and then screwing on the receptacle from the rear.

The stand is made of ⅛ by 1-in. band iron, shaped as shown in Figure 1. Care should be taken to make graceful bends so that the stand does not detract from the appearance of the completed heater. A bracket made of $\frac{1}{16}$ by ¾-in. band iron is attached to the bottom of the reflector by means of $\frac{1}{32}$ by ⅜-in. screws and nuts. A slot ¼ by 2 in. is cut in the bracket. The reflector is attached to the stand by means of a carriage bolt through the bracket and upper bend of the stand. The shoulder of the bolt is filed off so that only enough of the square portion is left to fit into the slot in the bracket to keep the bolt from turning when the wing nut is tightened after an adjustment for inclination of the reflector has been made. Various inclinations of the reflector can be obtained by loosening the wing nut and sliding the reflector bracket backward or forward until the desired inclination has been obtained and then tightening the wing nut. The hole in the upper bend of the stand should be ¼ in. in diameter. This hole may be located by trial, as probably no two students will obtain

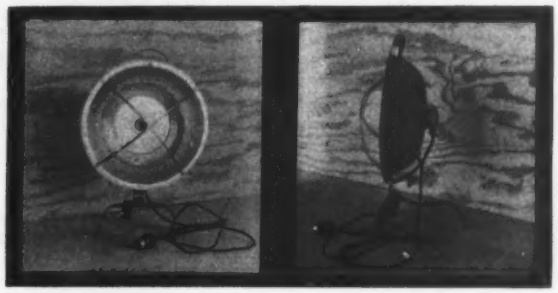


FIG. 2

the same curvature of the bracket and stand unless a jig is used. Care should be taken, however, that the curvature of the bracket and the upper bend of the stand are the same so that a snug fit results when the wing nut is tightened.

Bill of Material

1 pc.	⅛ x 1 x 20	Band iron	Reflector
1 pc.	$\frac{1}{16}$ x ⅜ x 7	Band iron	Stand
1 pc.	$\frac{1}{16}$ x ¾ x 4	Band iron	Handle
1 pc.	$\frac{1}{16}$ x $\frac{1}{16}$ x 24	Band iron or brass	Reflector guards
8	$\frac{1}{32}$ x ⅜	Machine screws and nuts	
2	⅛ x ⅜	Button-head rivets	
1	$\frac{1}{16}$ x 1	Carriage bolts	
1	$\frac{1}{16}$-in.	Wing nut	
1	10 or 11-in.	Tin washbasin	Reflector
5 ft.	No. 14 Asbestos-covered flexible cord		
1	Porcelain sign receptacle, with covered terminals		
1	Cone-shaped heater element		
1	Two-piece cord plug		

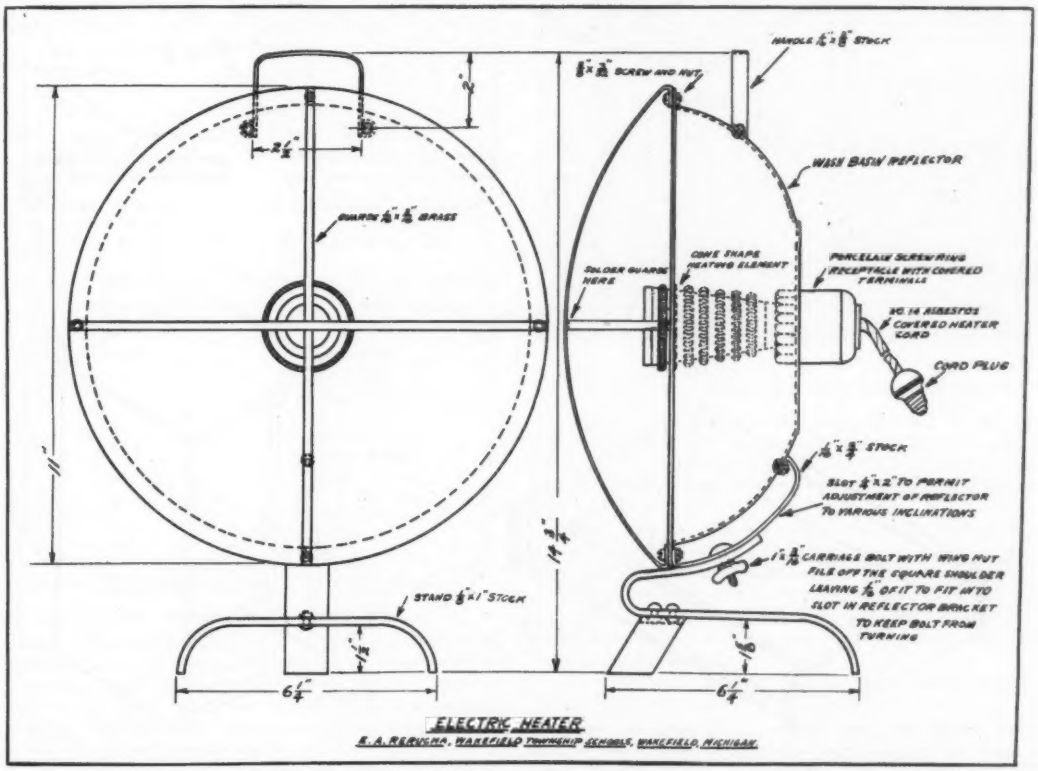

HANDLE ¼" x ⅛" STOCK
⅜" x ⅜" SCREW AND NUT
WASH BASIN REFLECTOR
GUARD ¼" x ⅛" BRASS
SOLDER GUARDS HERE
CONE SHAPE HEATING ELEMENT
PORCELAIN SCREW RING RECEPTACLE WITH COVERED TERMINALS
NO 14 ASBESTOS COVERED HEATER CORD
CORD PLUG
⅛" x ¾" STOCK
SLOT ¼" x 2" TO PERMIT ADJUSTMENT OF REFLECTOR TO VARIOUS INCLINATIONS
1¼" CARRIAGE BOLT WITH WING NUT FILE OFF THE SQUARE SHOULDER LEAVING ⅛" OF IT TO FIT INTO SLOT IN REFLECTOR BRACKET TO KEEP BOLT FROM TURNING
STAND ⅛" x 1" STOCK
6¼"
6¼"
ELECTRIC HEATER
E. A. RERUCHA, WAKEFIELD TOWNSHIP SCHOOL, WAKEFIELD, MICHIGAN

FIG. 1

The element is protected by two guards at right angles fastened to the rim of the reflector and at the center where they cross. The guards may be made of $\frac{1}{8}$ by $\frac{1}{16}$-in. brass or iron. They are attached to the reflector with $\frac{3}{32}$ by $\frac{1}{4}$-in. screws and nuts. A handle is made of $\frac{1}{8}$ by $\frac{1}{4}$-in. band iron and attached to the top of the reflector.

The heating element is a replaceable unit such as is used in the commercial types of heaters.

No. 14 asbestos-covered heater cord and a detachable cord plug are used to make connection to the house circuit.

To enhance the appearance of the completed heater, the stand, reflector bracket, and handle may be given a coat of black stove enamel. The reflector and guards may be given a coat of aluminum paint.

AN INLAID TELEPHONE STAND

Margaret Fullerton

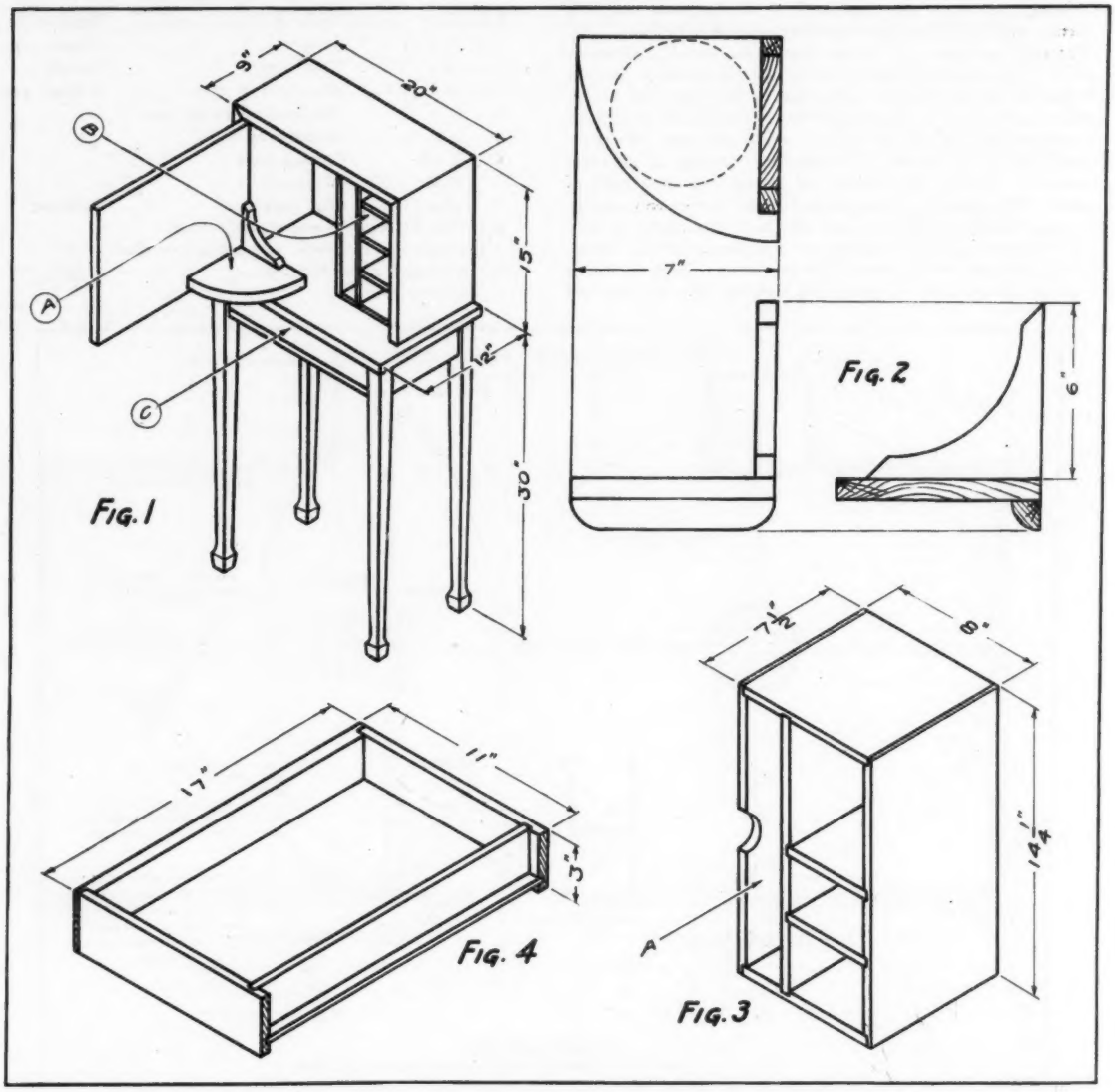
The telephone has been in common use longer than either the phonograph or the radio, but unlike these, has been developed along strictly utilitarian lines, with no attention to its artistic possibilities. This is partly true not because its first and most important use was for business, but mostly because, in this country, the telephone companies provide the instruments and have adopted the type combining strength with adaptability to manufacturing upon a quantity production basis. Consideration of individual schemes of decoration and harmony of styles between the telephone and other pieces of furniture in the room with it, do not interest the companies at all. If all the radios or phonographs in the country belonged to one or two big companies, from whom the users merely rented them, we would doubtless know these instruments, too, as ungainly golden-oak boxes, covered with cheap, shiny, varnish and surmounted by substantial, nickel-bound horns.

Hiding telephones behind movable screens upon desks, stands, or tables, is but a makeshift at best; while the attempt to disguise them as dolls, as is the custom in society dramas upon the screen, is even less successful.

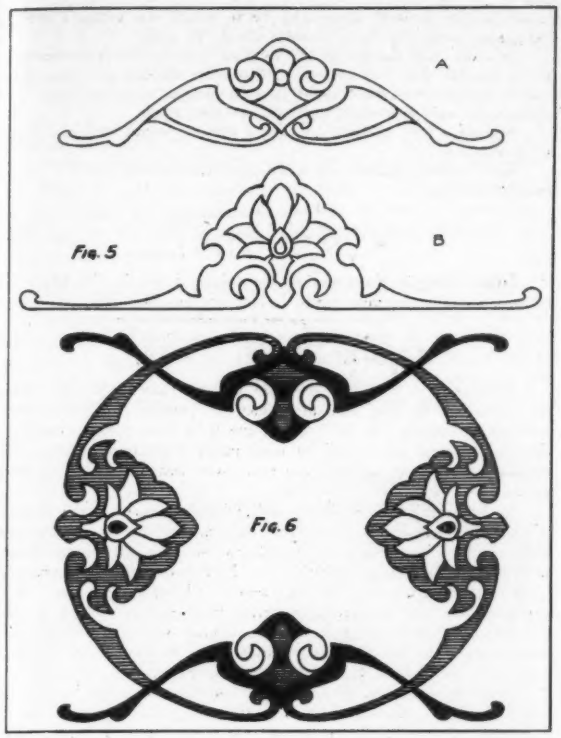
The telephone stand shown in the accompanying drawings solves the problem of installing the instrument in the living room, den, hall, or bedroom without creating the impression of having moved a section of a downtown office into the house.

The instrument rests upon the quarter-round shelf A, Figure 1, which is attached to the door by means of the bracket shown above it and the quarter-round below it as shown in Figure 2. Opening the door brings the telephone into position for use, and renders the pigeonholes which hold the directory, pads, pencils, and similar accessories instantly available.

The desk shown in Figure 1 was designed as a companion piece to the spinet desk described in the February, 1925, issue of the INDUSTRIAL-ARTS MAGAZINE, but can easily be made to conform to any period of furniture design and to harmonize with any style of decoration and finish.



TELEPHONE STAND DESIGNED BY MARGARET FULLERTON



INLAY DESIGNS

The inlay designs on the spinet desk may be used, or those shown in Figures 5 and 6 may be executed as inlay or as overlay. Carving, stenciling, or hand painting may be substituted for the inlay or overlay if desired.

Explanation of Drawings

Figure 1. Assembly Drawing of Telephone Stand.
A. Shelf upon which telephone stands.
B. Pigeonholes.
C. Drawer.
Figure 2. Details of Instrument Shelf.
Figure 3. Details of Pigeonholes.
A. Place for Directory.
Figure 4. Details of Drawer.
Figure 5. Inlay Designs for Front of Drawer.
Either A or B to be used.
Figure 6. Inlay Design Applied to the Front of the Door.

Suggested Color Schemes for Inlay Designs, Figures 5 and 6

Color of wood of which the stand is made.	*Colors of woods used for inlay.*
Medium brown	Dark brown Neutral red Neutral orange
Light brown	Medium brown Neutral orange Yellow
Dark brown	Black Red-brown Dark red

STENCILED HOUSEHOLD ARTICLES

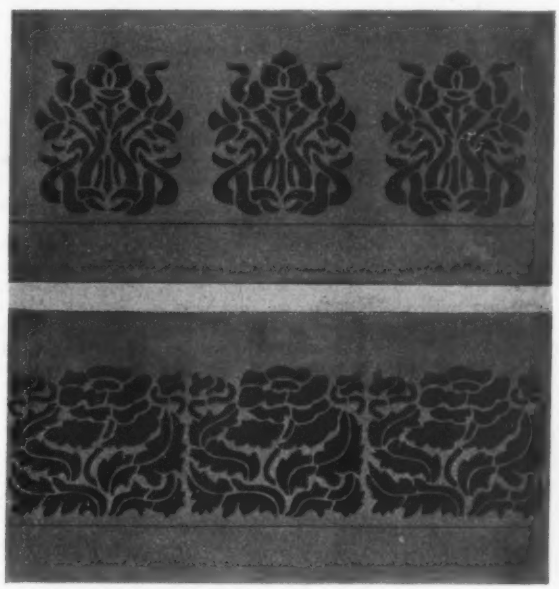
D. Elizabeth Roberts, Philadelphia, Pa.

The designs illustrated herewith, are very effective when stenciled on table runners, curtains or other articles. Stenciling is very popular, and it is something which the amateur need not be afraid to attempt. By means of it, very artistic effects can be obtained at little cost and with slight effort. For the benefit of those to whom stenciling is new, a few directions for the work are given.

First, trace the design on stencil paper, which is oiled paper or cardboard prepared for this purpose. It can be obtained at any store where artists' materials are sold. A substitute for the prepared stencil paper is ordinary cardboard which has been given a coat of shellac. Cut out the design with a sharp knife, resting the stencil on a board or on a piece of glass. Stretch the material which is to be stenciled over blotting paper and fasten it with thumb tacks. Plan the places for the stencil and mark the edges with chalk or basting threads. Then fasten the stencil securely with thumb tacks.

TULIP DESIGN POPPY DESIGN

Either dyes or oil paints may be used for the work. If oil paints are used, mix the colors with turpentine and add a small quantity of a specially prepared stencil medium, until they are the consistency of cream. Use separate, flat, bristle brushes for each color. Brush the color over the stencil, being careful not to have too much color on the brush. Before repeating the design on another part of the material, clean the stencil carefully. When the stenciling is finished, allow the colors to dry for at least a day, and then press with a hot iron, first spreading a damp cloth on the wrong side of the material.



UPPER. TULIP DESIGN
LOWER. POPPY DESIGN FOR TABLE RUNNERS AND CURTAINS

Another method of stenciling and one which is very simple, as well as quickly applied, is to use crayons instead of paint or dye. When these are used, the stencil may be made of ordinary cardboard, without any shellacking. After stenciling, press with a hot iron, the same as though paint or dye were used.

Linen, crash, or some other serviceable material would be suitable for table runners, while a variety of materials such as silk, scrim, cheesecloth, velveteen, etc., could be used for the curtains.

The poppy design is effective with the flowers and buds in shades of red or a rose color, and the leaves and stems in several tones of green. Material in white, tan, gray, or some neutral color should be used for the background.

The tulip border is pretty with the flowers done in orange or red, and the leaves and stems in tones of green.

Either of these designs would make very dainty curtains for summer use, if some thin material, such as scrim or cheesecloth, is used. The design should be stenciled across the bottom of the curtain, and then each unit repeated, one above the other, for the sides.

If crayons are used for the stenciling, it would not even be necessary to cut a stencil. Simply place the material over the design, which has been drawn on paper or cardboard. Trace the outline of the design and then rub over the spaces with the crayon. This will produce a very pleasing effect.

NEW FORMULA FOUND FOR COMPUTING COLUMN STRENGTH

The following column formula may be of interest to teachers of advanced architectural drafting.

A new and simple formula for computing accurately the strength of wooden columns commonly used in buildings, bridges, and other structures has been worked out by the Forest Products Laboratory, U. S. Forest Service.

In order that the type of column to which the formula applies may be understood, it should be stated that for building purposes three types of columns are recognized, namely: long columns, which depend for their strength on stiffness; short columns which depend for their strength on crushing strength in direction of length; and intermediate columns which depend on a combination of stiffness and crushing strength. The new formula applies to intermediate columns —those used most frequently in structural work.

The application of the formula to structural timbers was demonstrated in a test of southern yellow pine and Douglas fir timbers provided by the National Lumber Manufacturers' Association. The formula does not require any further knowledge of mathematics than is necessary to solve the straight-line formula now used by most engineers. What is of even greater interest, also, is that the Forest Products Laboratory formula is so accurate that it will enable the selection of columns which will maintain the correct load rather than columns whose strength is in excess of the loads for which they are intended. This very fact should bring about a greater confidence in wood as a safe building material.

The new formula is as follows:

$$\frac{P}{A} = S\left[1 - \frac{1}{3}\left(\frac{L}{Kd}\right)^4\right]$$

In this formula, P = load in pounds; A = cross-sectional area in square inches; S = maximum crushing stress, short column (pounds per square inch) or, in case of working loads, the safe stress for short columns; L = unsupported length in inches; K = constant, depending on modulus of elasticity and crushing strength for a given species, grade, and condition of service; and d = least dimension in inches.

Since both stiffness and crushing strength enter into calculations of the strength of intermediate columns, values for both these properties must be known in order to determine the necessary size of intermediate columns. However, the laboratory has prepared tables to accompany the formula which give values for the safe crushing stress, modulus of elasticity (measure of stiffness), and also for K, for most of the commercial species. The values for K represent the slenderness ratios (length to least dimension) below which the formula applies. For greater ratios the Euler formula should be used.

In order that the use of the formula may be clearly understood; let us suppose that it is desired to determine the size of columns required to support the floor girder in a dwelling or store building. The wood to be used is western hemlock, common grade.

Assume a load of 20,000 lb. for a square column, and the length of column 9 ft.

Since square columns are to be used, the formula, may be written,

$$d = \sqrt{\frac{P}{23} + \sqrt{\frac{1}{3}\left(\frac{L}{K}\right)^4 + \left(\frac{P}{23}\right)^2}}$$

Substituting in the equation the values shown in the tables for western hemlock, common grade, indoor dry location, gives

$$d = \sqrt{\frac{20000}{1440} + \sqrt{\frac{1}{3}\left(\frac{108}{28.3}\right)^4 + \left(\frac{20000}{1440}\right)^2}}$$

Solving, $d = 5.38$ in., the side of the square column. Since the nominal 6 by 6-in. column (American Lumber Standards) when surfaced is actually 5⅜ by 5⅜ in., the 6 by 6-in. column would be the smallest one that could be used under the circumstances. Obviously, a 5 by 5-in. column, the next lower size, would be too weak to use.

So little faith have engineers and architects reposed in the accuracy of formulas representing the strength of structural timbers, in the past, that they have been led to use high factors of safety in column design. It is natural to suppose that this may have resulted in an appreciably greater use of materials other than wood for building purposes. With the increasing cost of building material, however, has come a demand for better formulas for safe working stresses which would permit a more economical use of structural timbers. The new Forest Products Laboratory formula is the answer to that demand.

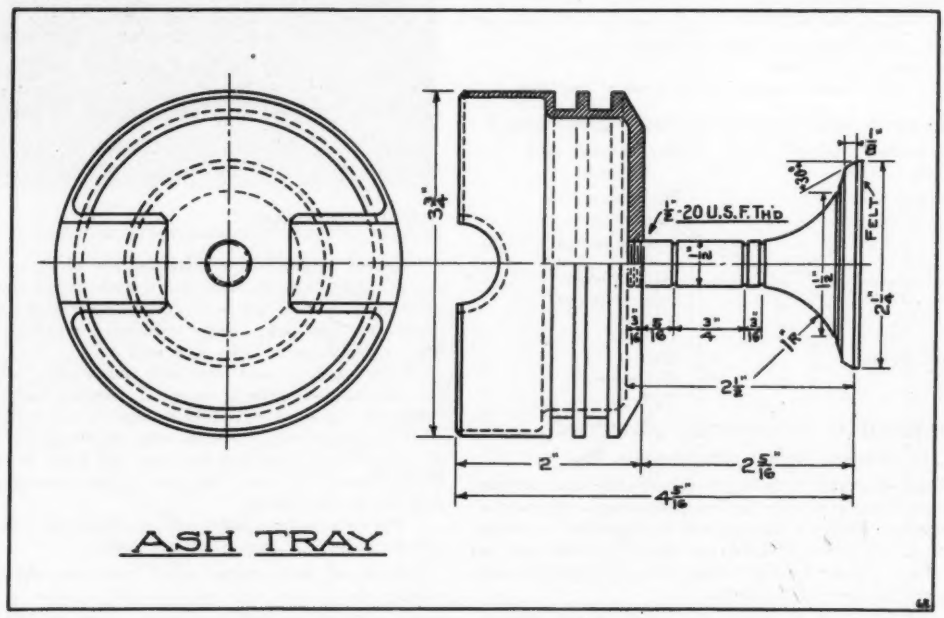
An interesting discovery made in connection with the formula test was that of the influence of knots on the strength of long columns. It has been quite generally recognized for many years that knots have little influence on the stiffness of timbers. Since the long column is dependent upon stiffness for its strength it follows that knots have little effect on strength of long columns. This was borne out by the tests of the formula.

A USE FOR DISCARDED AUTOMOBILE PISTONS

Albert J. Pfau, Shop Foreman, Winship School, Boston, Mass.

A very useful ash tray can be made from discarded pistons of almost any make of automobile. Those from some cars, of course, are more adaptable than others. The one here illustrated is made from a Ford piston.

The piston is first cut through slightly below the center of the piston-pin bushing hole with a hand or power hack saw. The half



USING DISCARDED AUTOMOBILE PISTONS

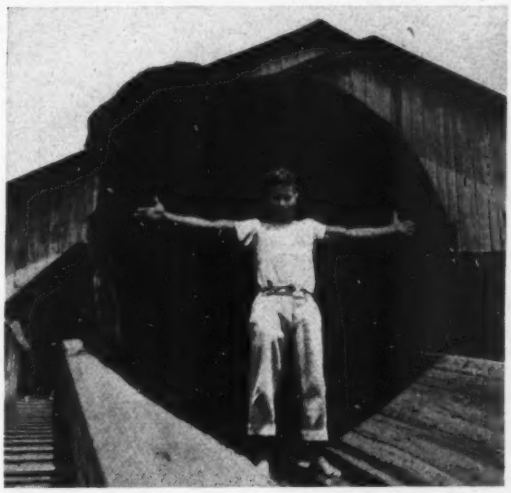
piston is then put in a lathe chuck and squared up. It is then reversed in the chuck and drilled for tapping. It is well to tap it while in the chuck to assure straight tapping. Carbon deposits may be removed with emery cloth while the piece is revolving in the lathe.

The base is turned on a lathe, from a piece of cold-rolled steel. It offers an opportunity for practice in hand tooling. The narrow grooves cut around the base stem are used to ornament this part. A thread is then cut with a die while the piece is still in the lathe.

After the pieces are assembled the whole is nickle or brass plated on the outside, and the inside is painted. A piece of green felt is shellacked to the base to prevent marring the furniture upon which the tray may be placed.

PHILIPPINE MAHOGANY FOR SCHOOL USE

Philippine mahogany has been in use in the United States for about 23 years, having been used quite extensively on the Pacific Coast for interior trimming before its introduction into the eastern market about eighten years ago. Philippine mahogany is a moderately open-grained wood, varying in texture from pieces which are quite soft and



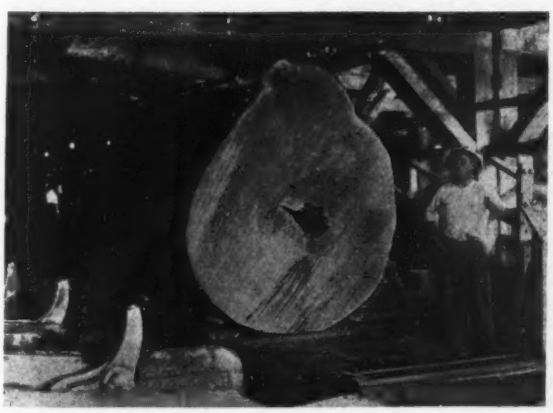
PHILIPPINE MAHOGANY LOG ENTERING MILL

porous, to pieces that are about as close-grained and hard as Mexican mahogany. The variation in texture is one of the many valuable points of the wood, since it permits its use, when properly sorted, for a wider range of purposes than many other woods.

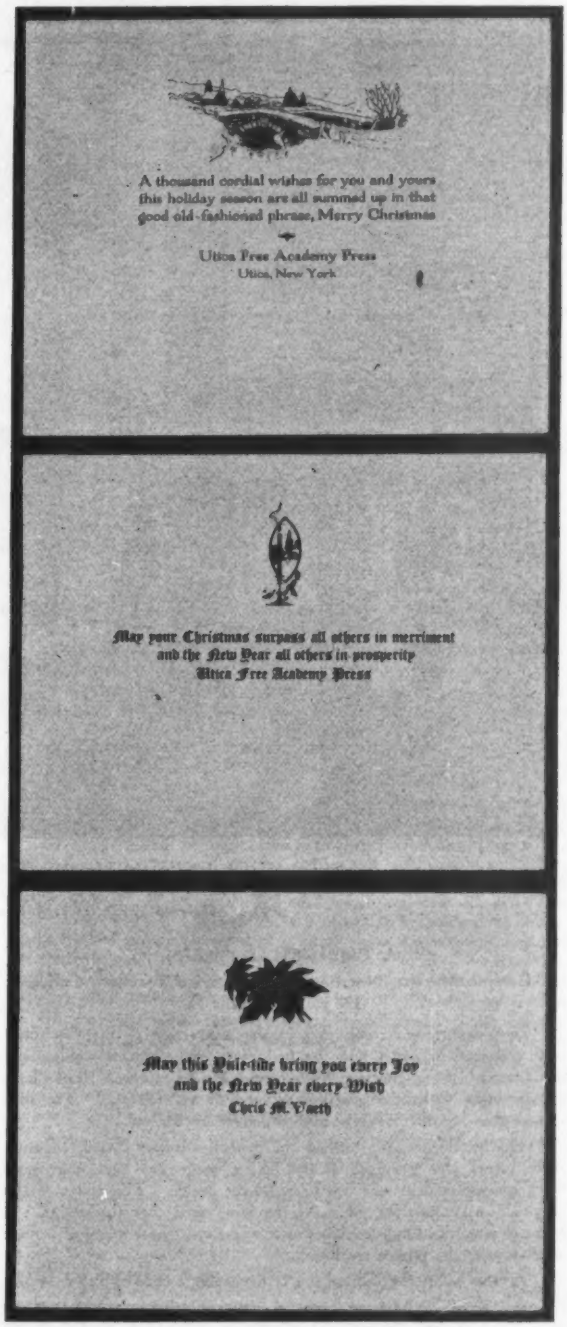
Philippine mahogany is manufactured into lumber in the Philippines on a concession covering 100 square miles on the Island of Negros. The plant is up-to-date in every way. It is equipped with dry kilns, planing mill, and flooring mill, and has an output of four and one-half million feet monthly. After the lumber is thoroughly seasoned, it is loaded on barges at the mill, towed to Manila, and shipped by steamer to New York. Upon arrival at New York, the lumber is brought to a deep-water lumber yard at Brooklyn, where it is reinspected before it is shipped out on orders.

The grade sold for manual-arts work is practically clear, except for minute needle-worm holes. These holes are so fine that it is difficult for anyone but a trained inspector to discover them in the rough lumber and they are concealed in the finishing process. Stock free from needle holes can also be furnished when desired.

Philippine mahogany is used in large quantities for manual-training work. The New York schools alone used about 100,000 ft. of it during 1927. Since Philippine mahogany is manufactured into lumber in the Philippines and comes into the United States duty free, it is sold at prices which compete with such woods as poplar, white pine, birch, and oak, and many of the schools prefer to use Philippine mahogany instead of these woods.



PHILIPPINE MAHOGANY LOG ON SAW CARRIAGE


A thousand cordial wishes for you and yours this holiday season are all summed up in that good old-fashioned phrase, Merry Christmas
Utica Free Academy Press
Utica, New York
May your Christmas surpass all others in merriment and the New Year all others in prosperity
Utica Free Academy Press
May this Yuletide bring you every Joy and the New Year every Wish
Chris M. Vaeth

CHRISTMAS CARDS PRINTED AT THE UTICA FREE ACADEMY. MR. CHRIS. M. VAETH, INSTRUCTOR

With Sincere Wishes for a Joyous Christmas and a Prosperous New Year
Class in Printing, Taylor Street School
Fig. 1
A Merry Christmas
Fig. 2
Christmas Greetings
Fig. 3
Greetings at Christmas
Just to say "A Merry Christmas,"
This I'm sending you today,
May your joys abide forever
And your troubles speed away.
Fig. 4
Merrie Christmas and A Happy New Year
Ed. & Ed. Hunt
Fig. 5

OTHER CHRISTMAS CARDS CONTRIBUTED BY VARIOUS SCHOOLS
Fig. 1. Printshop of the Quincy Prevocational Center, Boston, Mass.
Figs. 2, 3, and 4. Printshop of the Worcester Trade School, Worcester, Mass.
Fig. 5. Designed by Ed Hunt, Milwaukee, Wis.

A CHRISTMAS CARD

L. Eveline Merritt, Northern Illinois State Teachers College, De Kalb, Illinois

Four departments took part in the production of the Christmas card described herewith. In the first place, the public-service department furnished the idea and inspiration. It said in effect, "Let's have a community Christmas greeting to send to our friends." The idea spread and the other departments responded to the call.

The art department formed the general advisory board, choosing stock, colors, and spacings. It also held a competitive contest in order to choose the student who was to make the design. The design finally adopted was a six-color job. At the same time that the design was being drawn, the English department was similarly choosing the students to write the proper sentiments.

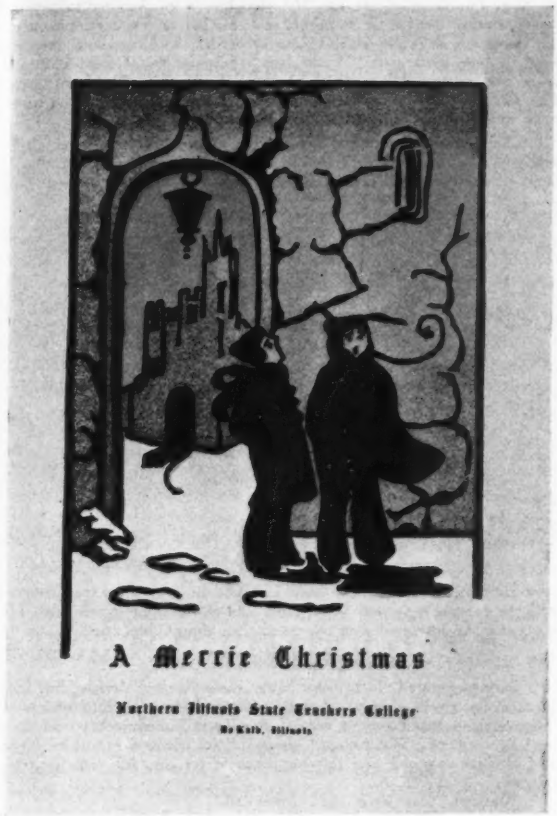
At this point the industrial-arts department entered the field and six linoleum blocks were cut from the design presented. These, together with the greetings and English sentiments, were then printed in the printshop. Each card, of course, had to pass through the press six times. The finished product was then passed to the public-service group who took care of the distribution.

MEASUREMENT IN VOCATIONAL GUIDANCE

Blanche E. K. Evans, University of Cincinnati

During the week, two women spent an afternoon with me in a periodic renewal of friendship that has stood the test of time for forty years. We are bound by that greatest of extra-family ties—we went to school together. In the course of conversation we touched upon the life history of many of our classmates; some successes, some failures. The consensus of opinion was that those who succeeded were doing the things for which they were eminently fitted; in most cases, the failures were caused by attempting tasks for which nature had never endowed them.

Today our minister preached a sermon on the "sheep tendency" of human nature and the great need for leadership. He stressed the economic waste and spiritual misery of going blindly into lines of work for which God had not prepared nor intended us, and called attention to the crying need for men and women strong enough, and sufficiently well equipped, to guide, advise and steer these weaker lives into situations where they can get the maximum happiness and give the maximum service. The two women and the minister did not know



that they were touching upon a question that has troubled the writer of this paper ever since she became a home-room teacher in a high school, and the teacher of a music course which students are advised to elect as part of their vocational equipment.

For the last few years we hear much about tests and measurements. As a member of the teaching profession, I am ready to try the latest vocational compass offered by educational experts. If I am ill, I take my physician's prescription. If I am buying a typewriter, I listen carefully to the salesmen of different "best sellers," and decide upon the machine suited to my needs. Why then should I not have an ear for the voice of authority in pedagogical work?

My mother's ambition was for me to be a concert pianist. Even when father lost a fortune, I struggled to fulfill that dream for mother. Ridiculous, when one considers I have neither the physique required by the rigorous practice incident to concert work, nor the musical endowment to make success possible! If only some one had said then, "Measure her! Test her. Let us see what is the trouble." The experience of disappointment, the chagrin of having been atiptoe for something beyond my reach, made me canny with my children. They were carefully watched for "tendencies" and my son's work as an army officer is termed brilliant by his superiors, and my daughter is happy with her swimming and dancing. Had I followed wish instead of apparent ability, I would have tried to make a doctor of my boy and a teacher of languages of my girl, and probably they would be failures. But, in many persons, there is no strong indication of talent for a particular occupation or profession. What shall we do then?

Every year girls come to me as their adviser, saying, "I want to be an actress, but my mother thinks I should take the commercial course." "I love art. I can draw and paint but my parents want me to be a stenographer." "I want to be a school teacher, but my friends say, 'Why do you want to be an old maid? Why don't you take the domestic-science course and get married?'" And the music students say, "Yes, I want to be a gym teacher, and I hate music." "Yes, I am going to be a kindergarten teacher. I love little children. But I just can't keep time. Must I take the music?" And other pupils, with no more ear than a teakettle and no more intellect than a turnip, flounder and struggle with music and refuse to give up. The teacher can inquire into their homelife and heredity, and from what she knows of them by actual contact, can hazard a guess and offer a few suggestions, but oh, the longing for the omniscience of God who can "see each tree with reference to the future forest."

Terman tells us that "the essential characteristic of *scientific* knowledge is that it can be used as a means of predicting what will happen if certain conditions are given." The entire program of a child's educational treatment hinges on this possibility of prediction. Hollingworth traces for us the evolution of the attempts of the human race to make vocational prognostication by means of astrology, magic, phrenology, physiognomy, and sample trial, with more or less (emphasis on the less) success. With the history of the past and the experience of the present we are familiar.

Dr. Thos. C. McCracken, in his "study of Vocational Interests of Children of the Cincinnati Public Schools," remarks, "Vocational guidance must begin earlier than high school," and in 1920 suggested that a study of each individual child be made in the following fields:

1. *a*) *Intelligence tests.*
2. *b*) *Educational tests and measurements.*
   c) Teachers' marks.
3. *d*) *Vocational analysis tests.*
   e) Physical tests.
   f) Child's vocational interest.
   g) Child's social and economic condition.

We move very slowly. Dr. McCracken has mentioned at least three new teaching tools in 1920, and some of us today do not even know what they are, to say nothing of how to use them.

An intelligence test is a standardized, scientific examination designed by an expert psychologist, to show the mental level of the person tested. An educational test is a scientific examination prepared with a norm under given conditions, to expose the results of a certain amount of formal instruction. A vocational analysis test is a scientific examination, evaluated to show what proportion of the abilities necessary for *success* in a given occupation or art, are present in the person contemplating entering it.

My high-school music department has an enrollment of from 75 to 100 students. The yearly mortality is from 20 to 30 students, most of whom come from the beginning class. Almost all of those who survive the first year do good work, and in grades 11 and 12 it is rare for one of these pupils to have to take the June examination. Investigation has revealed that a *very* small percentage of those who withdrew or were dropped from the course was due to removal from the district, illness, injury to their hands or arms, or loss of access to a piano.

McCall says, "Failure is most frequently traceable to lack of brains." My personal observation corroborates his statement because I have found that the majority of my "quitters" were unable to cope with the study of music. Something was lacking. There were no previous data to consult, for they had had no musical education before they came to me, save the en masse instruction of our public schools, where the classes are large and there is no means of checking up results. Besides, music is not graded, because it does not "count."

How could I judge the ability and capacity of these eager, bright-eyed lads and lassies, who crowded each other for a place in my classes? Should I decide because a pupil's hands are clumsy and stiff from hard work he or she is not musically gifted? Yet a boy who has hands of this type has been one of my best students! That because their motor responses were quick, that therefore they would be skillful on the keys? Yet, a girl of this type has failed to acquire more than mediocre performance of first-grade music in her first year, whereas many in that length of time can play second- and even third-grade pieces.

It was decided to limit our enrollment to young people who could show an average of 80 per cent in all their eighth-grade subjects. We are told that a high IQ generally means satisfactory work in all subjects. But this 80 per cent which we were accepting was some teacher's mark. It was not the result of a standard test. Research in the cumulative records of past years, reveals that music is not the only poor mark. Many of the pupils who have low grades in music, also have low grades in the rest of their high-school work, although they were considered good students in the grammar grades.

In the years when "all who would might enter," I did not discover a single genius in music who was poor in all other schoolwork, but every year I have had one or two exceptional scholars whose work in all branches was equal to their superior musical ability. I have had only one pupil in ten years who was an utter failure in piano and harmony, and yet received an honor card in her other studies.

From this puzzling situation I have turned to "measurements" as the sanest method so far advanced for dealing with my problems. When Prof. Seashore tells me that I can measure scientifically certain hereditary abilities of my pupils which cannot be improved by training, but which *must* be present in a person who wishes to become a successful musician, I have the hope that at last it is going to be possible for me to exclude a number of applicants of a type that has hitherto wasted my time and energy. When he proves to me that there are many kinds of successful musicians and to fail in one department is not to fail in all, I see that my pianistic failure may learn to play the flute, or he may become a conductor, or he may learn to sing, or to become a wonderful critic.

When S. A. Courtis shows by scientific graphs that individuals much alike in their natures will respond to uniform training in the same way, but that when two persons differ, they will react to the same stimulus in very different ways, I feel I shall have an entirely new means of class organization. By standard tests I can determine my differences and plan my adjustments.

It seems to me that in the field of vocational guidance scientific measurements have their *greatest* value. If a test can be invented in each occupation or profession that will show the vocational level at which success is *possible*, a pupil may be discovered to have sufficient ability to warrant entering any one of a dozen vocations, or his limit may be one or two. By consulting his economic status, his natural interests and his personality, we can be reasonably sure of steering him into a lifework where he can find satisfaction, and avoid wasteful loss of time and woeful heartbreak. He will not be like the minister of my acquaintance who, after careful collegiate and theological preparation, lost six successive charges but made an instant and astounding success on the stage.

Nor upon examination of the members of a particular calling, when standard measurements have been adopted, will we find, as did J. K. Flanders, persons with an IQ permitting them to take a college education, working side by side with others incapable of passing the eighth grade. For it is just as much an error of guidance to let an individual of high IQ choose an occupation below his level as to have him select a vocation requiring a higher grade of ability than he possesses.

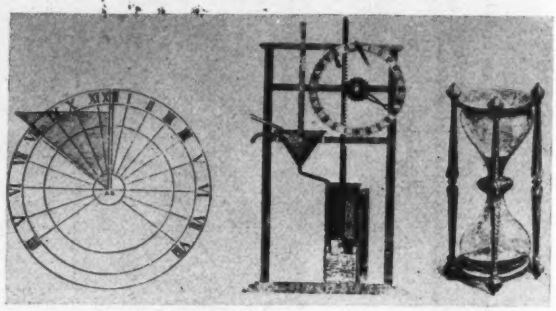
Terman tells us that superiority or inferiority tends to manifest itself early in life, and, barring accidents, a person's IQ remains constant with age. This will be little influenced by formal instruction, but it will clearly show whether such formal instruction can be assimilated or not. As teachers we must inspire our pupils to seek vocations worthy of their highest abilities as shown by the various tests mentioned in this paper. Herein lies the value of providing at every step of the way for the vocational possibilities of our girls and boys, for only by *pro*-vision can we control the phenomena of education.

THE EVOLUTION OF GRANDFATHER CLOCKS

The rare old walnut chime clock that graced Colonial halls and stairways represents a great advance in timepiece construction since the sun dial of the ancients was first devised. Many of these clocks, built centuries ago by master cabinet and clockmakers, are preserved to this day.

The limitation of the sun dial was due to its inability to register during cloudy weather or at night, and this led to the development of the clepsydra, or water clock. One clepsydra, with dial and rotating hand, is here illustrated. Water from an upper vessel dripped into a lower one, raising a float which revolved the hand by means of gears. The sun dial, however, was still used after the invention of the water clock to check the accuracy of the latter.

Changes in temperature affected the accuracy of the water clock, and after the invention of glass the sand or hour glass was introduced. Sand in the hour glass ran from an upper bulb through a small hole to a lower bulb. When the sand had run out, the glass was inverted and the process repeated. The sand was carefully prepared from fine black marble dust, boiled in wine and then thoroughly dried.



EARLY DEVICES FOR TELLING THE TIME. LEFT, THE SUN DIAL. CENTER, THE CLEPSYDRA OR WATER CLOCK. RIGHT, THE HOUR GLASS

Springs and Weights Used

Spring-operated clocks were better than previous devices, but were at first inaccurate, due to change in tension as the spring unwound. To overcome this defect a conical spool was introduced, on which a cord was wound. As the cord unwound, its effective radius of action and leverage changed, and this compensated for the reduction in spring tension.

Weights, too, were used, their advantage being that they supplied a constant force until the clock had entirely run down. Springs, however, proved more satisfactory as improved escapements were developed and with the introduction of the pendulum, still greater precision was obtained. Today, the master clock in the Naval Observatory at Washington, though electrically operated, is regulated by a pendulum.

The greater accuracy obtained with long pendulums was responsible for the development of the tall grandfather and hall type of clocks. Records show that these were made with extreme accuracy and were fitted with cases made of the finest wood. The case was primarily required to protect the pendulum from drafts, but it also presented an opportunity to cabinetmakers, many of whom put their best efforts into clock cases, producing some that were beautifully carved and inlaid or covered with delicate marquetry.

A GRANDFATHER-TYPE CLOCK IN WALNUT

Clocks that Lasted Centuries

The combination of great care in building the case and extreme skill in constructing the works produced clocks that have lasted for centuries. One such clock, now carefully preserved in a small Virginia town, was made by William Tomlinson prior to 1735. It is of walnut, the entire base, case, waist, and hood being completely covered with a fine network of marquetry, known as "Seaweed" or "Spiderweb" design.

This Tomlinson clock is typical of those made in England, but the early Colonial days also saw many fine clocks made in America. One such clock was ordered from Devereux Bolby, by John Hancock, first signer of the Declaration of Independence, who specified that it should have a walnut case. The clock served for years, a familiar object in the Hancock home, and is now preserved by the American Antiquarian Society, an interesting memento of those historic times.

THE CRAFTSMAN

A man with a trade is a man indeed,
If the man and the trade are one;
And the trade of a man is an honest creed,
When a full day's work is done.
If the trade of a man is the printing art,
And his standard is high and clear;
A craftsman he'll be and worthy the part,
In the trade he will rank as a peer.

It's the day of the man with art and skill,
And a clear-cut planned design;
The kind that comes when the night is still,
As he delves into chart and line
Of a scheme approved on a printed page,
Made plain by some master mind;
And given the test in the trying age,
As applied to the task, refined.

The knowing how brings the man his joy,
When the hard, stern job's in hand;
And the best that's in him finds employ,
As he meets each strict demand.
When he shares his knowledge, his turn and plan,
He gives, yet is richer thereby;
For he gets from his fellows without stint or ban,
Which all to their task do apply.

The worth of a trade is the worth of a man,
The trade but reflects what prevails;
It is lifted on high if he does all he can,
Or is dragged in the mire if he fails.
The man at his best is a craftsman true,
His work is his boast and crown;
No tablet of bronze need be cast as his due;
What he is and he does brings renown.

—*Alton B. Carty, The Producer.*

The Producer. Official publication of the Boys' Vocational School, Atlantic City, N. J., for December, 1927.

ASSOCIATION AND CONVENTION ACTIVITIES

THE A. V. A. CONVENTION

The American Vocational Association will hold its annual meeting December 13, 14, and 15 at Philadelphia, Pa. Mr. R. L. Cooley, president of the association, will preside.

The theme, "Education and Industry in Cooperation," has been chosen for the 1928 convention. The convention sessions will commence with sectional meetings Thursday afternoon, December 13. The first general section will be held on Thursday evening. On Friday, the 14th, sectional meetings will be held in the morning, and a general session in the afternoon. The banquet and dance will be held Friday evening. Saturday morning will be devoted to the various sections.

Visits to the schools of Philadelphia are planned for Wednesday afternoon and evening, December 12 and 13. Senior and junior high schools, industrial-arts and trade education, and new buildings recently opened will attract the interest of the visitors.

Visits to interesting places in the city and vicinity are scheduled for Saturday afternoon, December 15. Among the points of interest will be the Delaware River bridge, the harbor, the navy yard, and Valley Forge.

The convention headquarters will be in the Benjamin Franklin Hotel, where excellent facilities have been provided. Splendid arrangements have been made for commercial exhibit space and for meeting places. A special section has been reserved for the exhibit of tools, supplies, books, and machines devoted to vocational-education purposes.

THE ILLINOIS VOCATIONAL SOCIETY TO HOLD MEETING

The Illinois Society for Vocational and Practical Arts Education will hold its third annual meeting October 12 and 13 at the Hotel La Salle, Chicago, Ill. President A. W. Evans, of Chicago, will preside.

The first session on Friday morning will be in charge of Mr. C. A. Bennett of Peoria, Ill. The speakers at this occasion are: Mr. John J. Metz, editor of The Industrial-Arts Magazine; Mr. Arthur B. Mays, of the University of Illinois; Mr. Edward J. Tobin, superintendent of the Cook county schools; Mr. J. O. McKinsey, of the University of Chicago; and Miss Nellie Ryan, principal of the Continuation Schools.

At the banquet on Friday evening, Mr. Evans, president of the society, will act as chairman. Among the speakers are Supt. William J. Bogan of Chicago; Mr. John H. Walker, of the Illinois Federation of Labor; and Mr. Francis G. Blair, state superintendent of public instruction.

On Saturday morning there is another session, with Mr. A. G. Bauersfeld, of Chicago, as chairman. Among the speakers at this meeting are: Mr. R. L. Cooley, director of vocational education, Milwaukee, Wis., and president of the A. V. A.; Mr. Albert F. Siepert, professor of education, Bradley Polytechnic Institute; Mr. James McKinney, director of the American School; Mr. Carleton W. Washburne, superintendent of schools at Winnetka, Ill.; and Mr. John A. English, member of the board of education of Chicago.

There also will be held a number of sectional meetings on art education, commercial education, home economics, industrial education, part-time education, personnel and guidance, country life, and printing education.

THE TEXAS PLUMBING INSTRUCTORS' CONFERENCE

The first annual short course for plumbing instructors in Texas will be held on November 12, at the A. & M. College, College Station, Tex. The work will be in charge of the department of industrial education of the college, assisted by the state department of industrial education, the bureau of industrial teacher training of the state university, and the departments of mechanical engineering, architectural, chemistry, and sanitary engineering departments.

The course, which will run for two weeks, will be open to all those employed in, or interested in, the training of plumbing apprentices and journeymen. It is found that a great many local supervisors of industrial education and officers of masters' or journeymen's organizations attend the short course in order to receive assistance in organizing classes in their own cities.

Among the major short courses offered are the following:

1. Organization and administration of schools for apprentice plumbers and steamfitters.
2. How to use the standard texts on plumbing and steamfitting.
3. Methods of teaching apprentice plumbers and steamfitters.
4. The teaching of related subjects.
5. Trade analysis in plumbing and steamfitting courses.

The teaching staff will consist of the following:

Prof. S. E. Dibble, Carnegie Institute, Pittsburgh, Pa.; Mr. S. Lewis Land, of the National Plumbing and Heating Industries, Evansville, Ind.; Mr. N. S. Hunsdon, state supervisor of industrial education, Austin, Tex.; Mr. H. Dignowity, director of foreman training in the University of Texas, Austin; Prof. E. L. Williams, department of industrial education, A. & M. College, College Station, Tex.; Dr. F. E. Giesecke, of the A. & M. College, College Station, Tex.; Dr. C. C. Hedges, of the A. & M. College; and Prof. W. D. Bliss, of the department of mechanical engineering, A. & M. College.

THE INDIANA VOCATIONAL ASSOCIATION CONVENTION

The Indiana Vocational Association will hold its annual meeting in conjunction with the State Teachers Association, October 18, at Indianapolis, Ind. Preceding the first session, which will start at 10 a.m., there will be a meeting of the officers and the board of directors, consisting of the following:

Officers: Harry E. Wood, Indianapolis, president; Glenn D. Brown, Muncie, vice-president; Mary Beeman, Indianapolis, secy-treas.

Directors: J. R. Stubbs, Pendleton, representing Agriculture; C. D. Rotruck, Anderson, representing Trades and Industry; Geraldine Hadley, Indianapolis, representing Home Economics; F. H. Gillespie, Indianapolis, representing Commercial Work.

The general session will be addressed by R. L. Cooley, director of vocational education, Milwaukee, Wis., and president of the American Vocational Association. His subject will be "The Philosophy of the Part-Time School." Mr. Dewitt S. Morgan, vice-principal of the Arsenal Technical Schools of Indianapolis, will speak on "The Relation of Vocational Guidance to Vocational Education." Mr. George K. Wells, supervisor of trades and industry in Indiana, will speak on "The Apprentice Viewpoint."

At the business meeting, financial assistance in legislative matters pertaining to vocational education, will be discussed. Election of officers for the coming year also will take place. The nominating committee consists of Ammon Swope, associate professor of Purdue University, Lafayette, Ind.; Allen Hamilton, director of vocational work in Bloomington, Ind.; and Ray H. Peck, teacher of vocational work, Kokomo, Indiana.

At the close of the meeting there will be a luncheon at the Claypool Hotel.

HOLD ANNUAL SAFETY CONGRESS IN NEW YORK CITY

The seventeenth annual safety congress was held October 1 to 5, in the Waldorf-Astoria Hotel, New York City. President Homer E. Niesz presided at the sessions.

At the vocational session on Tuesday morning, Dr. Lewis A. Wilson, of Albany, N. Y., was in charge. Mr. Ronald Kent, of the Essex County Vocational School at Newark, N. J., talked on "Teaching Safety in the Vocational Schools," and Mr. John M. McDowell, of Albany, N. Y., discussed "Safeguarding Vocational-School Equipment." Talks on the teaching of safety were given by Mr. Frank A. Bouelle, of Los Angeles, Calif.; Miss Mary O. Pottenger, Springfield, Mass.; and Miss H. Louise Cottrell, of East Orange, N. J.

On Wednesday morning, Mr. O. J. Olson of Detroit, Mich., gave a talk on "Woodworking Safety Practices."

WORK MADE BY STUDENTS UNDER THE DIRECTION OF PROF. W. H. VARNUM, IN THE COURSE OF APPLIED ARTS AT THE UNIVERSITY OF WISCONSIN

APPOINTED DIRECTOR OF VOCATIONAL EDUCATION AT EL PASO, TEX.

Mr. Victor J. Smith, formerly director of industrial education at the Sul Ross State Teachers' College, Alpine, Tex., has resigned to become director of vocational education for the city schools of El Paso, Tex. Mr. Smith has had considerable experience as a teacher and supervisor of vocational education. While at Alpine, he was more

MR. VICTOR J. SMITH
Director of Vocational Education,
El Paso, Tex.

than head of the industrial-education department, for his work included the landscaping of the campus, the drawing of plans and the supervising of the construction of a natatorium, and the building of homes and student cottages. He received the bachelor of philosophy degree from Chicago University and during the past summer completed work leading to the degree of master of arts at Columbia University.

APPOINTED DIRECTOR AT SAN JUAN, PORTO RICO

Mr. Urgell has been appointed director of the Roman Baldorioty de Castro Technical School at San Juan, P. R. Mr. Urgell was, for

MR. FRANCISCO C. URGELL
Director, Roman Baldorioty de Castro Technical School,
San Juan, P. R.

seven years, chief instructor in the manual-arts department of the Central High School of Porto Rico. He succeeds Mr. Herman Hjorth, who has gone to Yonkers, N. Y.

MR. HUNTER JOINS STAFF OF THE IOWA STATE COLLEGE

Mr. William L. Hunter of Iowa City, Iowa, has recently joined the staff of the Iowa State College as assistant professor in the industrial-arts department.

Mr. Hunter is known to many industrial-arts teachers in Iowa He is a graduate of the Iowa Teachers' College and holds a master's degree given by Columbia University. He has completed one year of graduate work leading to a doctor's degree at Harvard University. Mr. Hunter has taught extensively in Iowa, having completed five and one half years' work at the state university and one year as assistant to the editor of the Manual Arts Press.

Mr. Hunter recently conducted a course in educational measurements at Bradley Polytechnic Institute, Peoria, Ill. His book of puzzle problems is now on the press.

MR. RASCHE BECOMES PERSONNEL MANAGER

Mr. Wm. F. Rasche, formerly professor of vocational education at the University of Pittsburgh, has been appointed director of personnel of the General Motors Truck Corporation, Pontiac, Mich. Mr. Rasche's previous training eminently fits him for this position. Trained as an educator, experienced as a skilled mechanic, interested in research work, and accustomed to handling men, he brings to his new position all the qualifications for success.

His work at Pontiac encompasses not only personnel management but also the planning of the educational program for the apprentices, cooperative engineering students, field-service men, and foremen. With Mr. Rasche's initiative and far-sightedness, it is not difficult to prophesy that many worth-while innovations in this type of work will be inaugurated in the network of plants controlled by the General Motors Truck Corporation.

NEW BOOKS

Drawing, Design, and Craftwork

By F. J. Glass. Cloth, 235 pages, 5¼ by 8¼, illustrated. Price, $4.75. Published by Charles Scribner's Sons, New York City.

This book will be found to contain much of interest to teachers of the industrial arts, although it is largely devoted to the graphic arts. Its numerous illustrations make it a veritable storehouse of ideas for embellishment of the industrial-arts work taught in our schools. It also is a valuable reference book to the teacher of drawing, modeling, craftswork, and printing.

A careful perusal of this book will fully repay the reader. Not only are the illustrations very numerous and interesting, but they are all exceptionally well executed.

Miniature Boat Building

By Albert C. Leitch. Cloth, 242 pages, 6 by 9, illustrated. Price, $3. Published by The Norman W. Henley Publishing Co., New York City.

This book will delight every builder of model boats. The author approaches the problems of the model builder in a scientific manner. The illustrations are good and it is a pity that the paper used for the book does not bring them out as well as they deserve. The chapter on the power plant for model boats is especially interesting.

History of Manual and Industrial School Education

By Lewis Flint Anderson. Cloth, 251 pages, 5⅛ by 7⅜, illustrated. Published by D. Appleton and Company, New York City.

The author traces the history of manual and industrial education from that practiced by the ancients, down through the work done by the early monastic educational institutions, through the schemes presented in the Utopas of More and Rabelais, down to the present development of this work.

The book is interestingly written and presents a wealth of reference material to those who wish to avail themselves of it.

Speed Toys for Boys

By A. J. LaBerge. Cloth, 96 pages, 7⅛ by 10, illustrated. Price, $1.25. Published by The Bruce Publishing Company, Milwaukee, Wis.

This book will be welcomed by the teacher of industrial arts who wants to present problems that will thoroughly interest his pupils. It is a well-known fact that boys like to make toys, especially such toys as scooters, pushmobiles, coaster wagons, bob sleds, toboggans, etc. The author thoroughly describes just how to make a great number of these things that fascinate the boys. The projects are all clearly shown by well-executed cuts so that the pupils have little trouble in following directions.

Making a Living

By Leverett S. Lyon. Cloth, 622 pages, 5¼ by 7¾, illustrated. Price, $2. Published by The Macmillan Company, New York City.

Professor Lyon's book should receive wide acceptance as a junior- and senior-high-school textbook, because it is in these schools where the question of how to make a living takes on or should take on a vital meaning.

The book is interestingly written and should be in the hands of everyone who has anything to do with vocational guidance.

HEED THE CALL

The American Red Cross Membership Drive, November 11-29, 1928

The annual roll call of the American National Red Cross to be held this year from Armistice Day to and including Thanksgiving day, November 11-29, will assist in the further development of international friendly work by the Juniors, as well as the many other services this great organization will be called on to render to humanity everywhere during the coming year.

The American Junior Red Cross poster shown herewith, which will be displayed in 160,000 schoolrooms during the 1928-29 school year, illustrates service for others through schoolwork, a basic principle of the Juniors.

PERSONAL NEWS NOTES

Mr. L. V. Sharp of Chicago Heights, Ill., has been elected supervisor of manual training at Monticello, Ind. Mr. Sharp is a graduate of the Northern Illinois Teachers' College and Bradley Polytechnic Institute, and has had three years of teaching experience.

Mr. C. W. Briles, state director of vocational education of Oklahoma, has been given a year's leave of absence in order that he may take a course at Peabody College, Nashville, Tenn. Mr. J. S. Vaughan, state superintendent of public instruction, has taken over the duties of the state director's office during Mr. Briles' absence.

Mr. L. J. Miller of Rock Springs, Wyo., has been elected supervisor of manual training at Villa Park, Ill. Mr. Miller is a graduate of Stout Institute and has had eleven years' experience as a supervisor of industrial arts.

Mr. Ross Cramlet of Selma, Iowa, has been elected instructor in manual training in the junior high school, Newton, Iowa, to succeed Merle Schlampp.

Miss Elizabeth Mitchell of Rochester, Pa., has been elected supervisor of art at Akron, Ohio, to succeed Miss Mary Brandon.

Mr. Winfield Martin has been elected instructor in sheet-metal work in the vocational school, Madison, Wis. Miss Lillian Miller has been elected home-economics instructor in the same school.

Mr. O. O. White of Stillwell, Okla., has been engaged as instructor in vocational agriculture in the high school at Perryville, Okla.

Mr. A. C. Ware of Hogansville, Ga., has accepted a position as agricultural teacher in the high school at Pickens, S. C.

Mr. O. C. Hatch of Geneva, Nebr., has been elected as instructor in vocational agriculture at Falls City. Mr. Hatch succeeds G. C. Cook, who has gone to the State Agricultural College at Fargo, N. Dak.

Miss Anna Brack has been elected as instructor in home economics, Mr. Frank Dejmek as instructor in cabinetmaking and sheet-metal work, and Mr. Neal Mitchell as instructor in machine-shop practice and auto mechanics at Marinette Vocational School, Marinette, Wis.

Mr. George Olson of Ketchekan, Alaska, has been appointed director of manual training in the high school, Coeur d'Alene, Idaho.

Mr. H. T. Ashford of Lemoore, Calif., has assumed his duties as assistant director of vocational education at Sacramento, Calif., in charge of trade and industrial education in the high school. Mr. Ashford succeeds Mr. Frank Vincent, who has been named director of vocational-education work for the entire Sacramento school system.

Mr. T. T. Lindsey, director of industrial education at the Peabody College for Teachers, Nashville, Tenn., has been given a leave of absence to take a special graduate course at Teachers College, Columbia University. Mr. Lindsey plans to return next June to Peabody to resume his work as director of the industrial-education department.

NEWS AND NOTES

Vocational Teachers Trained in Reducing Depreciation of Buildings. Training in farm shopwork for teachers of vocational agriculture has been introduced by the department of agricultural engineering of the Alabama Polytechnic Institute in order that farm students may be instructed in reducing the depreciation of the buildings and equipment.

Since most farmers spend more time on repairwork than on construction, it has seemed desirable to determine the repair experiences which the farmer will encounter and to teach the student how to meet these problems by including similar jobs in the farm-shop course. It is the purpose of the course in farm shopwork to give the necessary instruction and training which will enable the students to successfully perform the greater part of the mechanical work on the farm. It is brought out that teaching the various skills in connection with a farm job adds materially to the interest in the work, as in the case of making a feed hopper, repairing a milk pail, overhauling a tractor, or installing a bathtub.

Announcement of Examinations for Vocational Teachers in Chicago High Schools. Announcement has been made of an examination to be held in Chicago, December 27 and 28, 1928, for applicants who desire to teach industrial subjects in the city high schools. Four major subjects are included in the examination program, which embraces electrical construction, forge, foundry, and machine shop. The salaries attached to the position range from $1800 to $3300 for the Limited Certificate, and from $2000 to $3800 for the General Certificate. Applicants are required to meet the following qualifications:

Candidates for limited nonacademic (technical) certificates of teachers of special subjects in high schools must present in advance credentials showing:

a) A diploma of graduation from a four-year high school of the grade of the Chicago public schools, and in addition

b) At least five years of special training in the major subject.

Note. The five years of special training required of candidates for teachers of special subjects shall be interpreted to mean the completion of five years' special work as students in an accredited school. Practical experience and teaching experience may be substituted as part of the special training, but in all such cases the credentials must be specific and must be approved by the board of education.

The examination for all limited certificates will consist of a major and specified minors; the major counts 50 per cent in determining the final average, and candidates must attain a general average of 75 per cent, with at least 80 per cent on the major, and in case the major includes both written and practice work they must obtain 80 per cent in the practice test. The majors shall be the same as for general certificates, but the minors shall be less intensive.

Majors:

a) Educational theory of shop practices.
b) Mechanical drawing.
c) Theory paper and practical shopwork.

LIMITED CERTIFICATES

Minors:

a) English.
b) American history and civics.
c) Mathematics.

Candidates for general nonacademic (technical) certificates of teachers in high schools must present in advance, credentials showing at least two years of training in their major subject, and either

1. Graduation from an accredited college and two years' of successful teaching experience, or

2. Graduation from an accredited college, and completion of the required work in the Chicago Normal College, or one year of successful teaching experience.

All candidates for general certificates will be examined in one major and the minor subjects, as indicated below, and must attain a general average of 80 per cent with no subject below 50 per cent; provided, that the major subject shall not be the same as any of the minor subjects and shall be counted double the value of any minor paper in the examination.

Majors:

a) Educational theory of shop practices.
b) Mechanical drawing.
c) Theory paper and practical shopwork.

(Continued on page 28a)

NOW, ARE THERE ANY QUESTIONS?

Duck Boat

828. Q.: Where can I obtain a drawing of a duck boat?—*J. A. S.*

A.: The Popular Mechanics Press, 200 East Ontario Street, Chicago, Ill., have a book on boats which they sell for 50 cents. Forest & Stream Publishing Co., 9 East 40th Street, New York City, also publish a book on "Boat Building" by Stevens. You may, no doubt, obtain some information on the building of duck boats from the Rudder Magazine, 9 Murray St., New York City.

Full-size patterns for a large number of canoes, boats, launches, etc., may be obtained from Brooks Co., Saginaw, Mich.

Walnut Cedar Chest

829. Q.: Will you please tell me where I can purchase built-up stock for walnut cedar chests?—*C. H. D.*

A.: This material can be obtained from the John Schroeder Lumber Company, Milwaukee, Wis., or the Algoma Panel Company, Algoma, Wis.

Oregon Myrtle

831. Q.: The author of the article on the "Bud Vase" shown on page 329 of the September, 1928, issue of the INDUSTRIAL-ARTS MAGAZINE, suggests that Oregon myrtle be used for the project. Where can this wood or such other woods as camphor, lemon, etc., be purchased?—*A. G. H.*

A.: Lemonwood bow staves, or figured foreign hardwoods can be obtained from the J. H. Monteath Co., 206 Lewis St., New York City.

Telephone Stand and Chair

832. Q.: I am interested in making a telephone stand with chair to match. Have you a set of plans for this project?—*C. J.*

A.: A telephone stand and bench are described in "Problems in Furniture Design and Construction" by Madsen and Lukowitz, published by The Bruce Publishing Company, Milwaukee, Wis. Price, $3.

An article with drawings of a telephone table and stand appeared on page 375 of the October, 1928, issue of the INDUSTRIAL-ARTS MAGAZINE.

Plastic Clay

833. Q.: Your October issue of the INDUSTRIAL-ARTS MAGAZINE carries an article by A. E. Gray on "Polychrome in the School Shop." Where can one get plastic clay for such work cheap enough to allow using it in the manual-training room?—*R. P. K.*

A.: A cheap material for this kind of work was described in the article entitled "Glue Clay" on page 145 of the April, 1928, issue of the INDUSTRIAL-ARTS MAGAZINE. C. Anthony Van Kammen, in his articles "Finishing Book Ends" on page 342 of the September, 1927, issue, and the "Wastebasket" on page 382 of the October, 1927, issue of the INDUSTRIAL-ARTS MAGAZINE, gives another formula for making a material that can be used for polychrome work.

Scroll Sawing

834. Q.: Will you kindly give me the names of several cabinet-making firms who would be able to cut out scroll work for me?—*H. W. K.*

A.: Almost any sash and door manufacturer will accommodate you on a proposition of this kind. We have no directory which would enable us to give you the names of such firms in your vicinity. Probably you would have to send to Duluth to have this work done.

Mail Box

838. Q.: Where can I get a good design for pigeonholes used to receive mail which can be placed against the wall?—*G. W.*

A.: While we have no design for a mail box such as you desire, yet we feel that you can obtain very good clues on how to design one by inspecting the tool cupboard, shown on page 298 of the August, 1928, issue of the INDUSTRIAL-ARTS MAGAZINE. This design can be changed into an acceptable mail box by adding suitable pigeonholes. The sliding glass doors would protect the mail against dust and also against the eventuality of being blown about by stray currents of air.

A mail box that has been used for a long while at a large school in the middle west where the faculty numbers about 200, has pigeonholes measuring 9 inches wide, 4 inches high, and 12 inches deep. These pigeonholes are built about six high, and the entire mail box occupies one side of a rather long room. No attempt has been made at any embellishment. It has been designed for utility and that is all. Probably with this in mind, you can design a suitable mail box for your own use.

Silverware Chest

839. Q.: Can you tell me where to find plans for a silver table service?—*E. H. N.*

A.: A silverware chest is shown on page 47 of the book entitled "Plywood Projects." This book is published by the Algoma Panel Co., Algoma, Wis., and is sold for $1.

Antique Ships

840. Q.: I desire some designs and plans of antique ships, and would be pleased to have your prospectus. I particularly want plans and designs of the "Santa Maria" and a typical Viking ship if you can supply them.—*H. S. D.*

A.: The following articles which have appeared in previous issues of the INDUSTRIAL-ARTS MAGAZINE, may help you:

Ship Model Making, page 305, August, 1925.
The Santa Maria, page 211, June, 1926, and page 246, July, 1926.
Model Ship Building in a Summer Camp, page 258, July, 1926.
Miniature Yachts Built at Toledo, Ohio, page 279, August, 1926.
Finish for Ship Models, page 78, February, 1927.

A series of three books entitled "Ship Model Making" by E. A. McCann, explain in detail how to make worth-while models of a Barbary pirate felucca, a Spanish galleon, an American clipper ship, and the U. S. frigate Constitution. The books are published by The Norman W. Henley Publishing Co., 2 West 45th Street, New York City, and cost $2.50 each.

Cigar-Box Projects

841. Q.: Is there a book on the market containing cigar-box projects for use in schools? Where can Ivorene or Fiberloid be bought?—*F. A. P.*

A.: The following is a list of books on the market pertaining to cigar-box projects:

Cigar-Box and Wood Projects, and Box Furniture. By Brigham. $1.60. Century Co., New York City.

Cigar-Box Furniture. By Carr and Brady. 15 cents. Capital Supply Co., Pierre, S. Dak.

Ivorene material may be obtained from the following firms:

E. I. Du Pont de Nemours Co., Wilmington, Del.
Prang Co., 1922 Calumet Ave., Chicago, Ill.
The Celluloid Co., 30 Washington Place, New York, N. Y.
Fiberloid Corp., 55 Fifth Ave., New York City.
American Cellulose Co., 309 North Pennsylvania Ave., Indianapolis, Ind.
Viscoloid Co., Leominster, Mass.

Caning

842. Q.: Can you refer me to some articles on chair caning?—*D. F. K.*

A.: Articles on caning can be found in the following back numbers of the INDUSTRIAL-ARTS MAGAZINE:

October, 1914, page 179; February, 1915, page 63; October, 1915, page 163; September, 1917, page 351; August, 1920, page 315; April, 1921, page 152; May, 1925, page 190; and July, 1925, page 272.

The Manual Arts Press, Peoria, Ill., publishes a book entitled "Seat Weaving" by Perry. Price $1.25.

Restoring Blue Prints

844. Q.: How can overexposed blue prints be restored?—*B. F.*

A.: Overexposed blue prints can be restored by first washing the prints in water, then placing them into a tray containing a solution of 2 parts water to 1 part of saturated bichromate of potash. Allow the prints to remain in this solution until the blue has turned to a dark, rich color, and the white lines have come up quite clear. This takes but a few seconds. The prints are then washed in the regular way in clear water and the resulting prints are usually so fine that you may make up your mind to henceforth overexpose all your blue prints.

Four-Poster Bed

845. Q.: Can you furnish us with a drawing of a four-poster bed?—*E. C. E.*

A.: An article on a four-poster bed was published on page 288 of the July, 1923, issue of the INDUSTRIAL-ARTS MAGAZINE.

Interesting detailed examples of this type of bed may also be found in "Reproduction of Antique Furniture" by Hjorth, price $3.50, published by The Bruce Publishing Company, Milwaukee, Wis.

Instructors in electrical work

You need the best hand tools

In the electrical, as well as the woodworking shop the best materials and equipment are the cheapest to use. Manual training instructors have used Stanley Tools for many years because of their high quality.

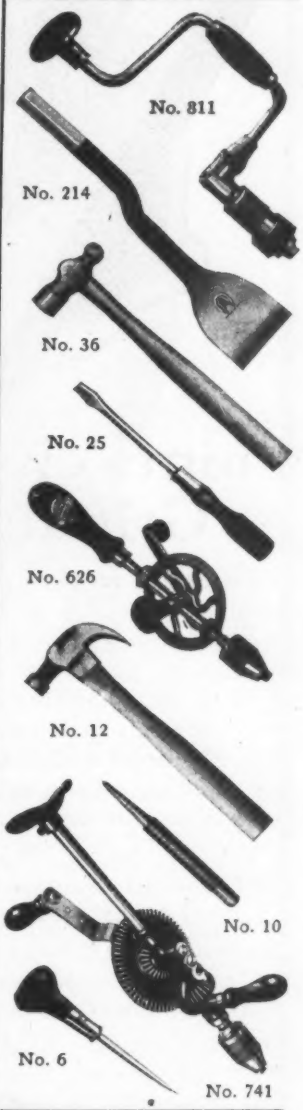
Here are some of the Stanley Tools suitable for the electrical shop. As quality tools they should interest you.

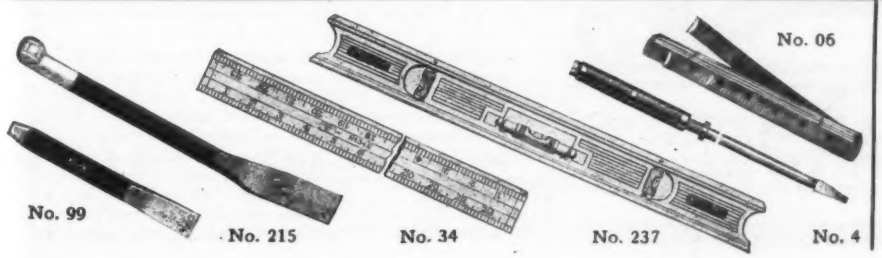
Send for our two catalogs. No. 34 shows the complete line of Stanley Woodworking Tools. Catalog No. 25 shows the complete line of Stanley-Atha Metal-working Tools.

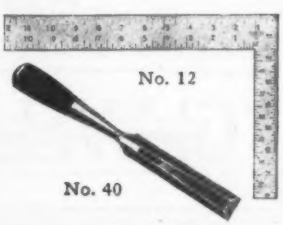
THE STANLEY RULE AND LEVEL PLANT
Educational Department, New Britain, Conn.

STANLEY TOOLS

STANLEY SW







Points on Drill Grinding

Putting a proper point on the business end of a twist drill doesn't sound hard—but the fact is that 11 pages, or practically 25% of the "Handbook for Drillers," are devoted exclusively to this all-important thing. In reality pointing a twist drill is a delicate piece of work calling for great skill, and much advance knowledge.

If you would like copies of the Handbook for the use of students in machine shop practice, we shall be glad to send them to you, without charge, in any reasonable quantities.

The CLEVELAND TWIST DRILL COMPANY
CLEVELAND
NEW YORK-CHICAGO-LONDON
SAN FRANCISCO

TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

(Continued from page 23a)

Minors:

a) English.
b) Professional study.
c) Mathematics.

Examinations for teachers in the senior high, junior high, and elementary schools are generally given during the last week of December and June of each year. The above examinations for the senior high schools and in addition for teachers of woodworking, mechanical drawing, printing, and auto mechanics will probably be offered next June.

Candidates are requested to file applications together with their credentials at least 30 days in advance of any examination. A circular of information, an application blank, and a sample set of questions may be obtained by writing to the Board of Examiners, Chicago Board of Education, 460 South State St., Chicago, Ill.

Industrial-Art School to Be Opened. Modern American decorative and industrial art will be advanced with the foundation of a School of Industrial Art by the Association of Arts and Industries and the Art Directors' Club of Chicago this fall. The new school is the result of an awakened interest in homemaker's decoration of neglected rooms. The purpose of the school is to train competent designers for the manufacturers.

Enrollment in Vocational Education Increases in Portland. Enrollment in the department of vocational education in Portland, Oreg., has increased 135 per cent during the past year, according to Mr. L. E. Brigham, director, in his annual report. The work of the department covers training in 36 occupations, which are carried on in ten locations throughout the city.

In the apprenticeship school, conducted in the Stephens school building, with classes in bricklaying, carpentry, painting, paperhanging, plastering, plumbing, sheet metal, steam and operating engineering, and steamfitting, there are 264 enrollments, and in the women's vocational school, in the Atkinson school building, in classes in garment making, power machine operating and millinery, 452. In journeymen training and building trades, in the Stephens school building, 138 were enrolled; in journeymen training in the Union Pacific railroad shops, 326, and in home economics, 522. The total registration was 1702.

Work Begun on Portland Model Home. Construction work on the Oregon building congress model home at Portland, Oreg., was recently begun. The home is being built as a cooperative project to demonstrate the class of work being done by the graduates of the building apprentice school under the auspices of the school board and the building congress.

The plans for the home were prepared by a special committee of the Oregon chapter of the American Institute of Architects, and provide for a two-story, six-room house of early American and English architecture.

The construction work is being done under the direction of Mr. David Anderson, apprentice instructor in carpentry.

Vocational Agriculture Course at New Paris, Ind. A new twelve months' vocational agriculture course has been introduced in the high school at New Paris, Ind. The students will spend one half of their time in vocational subjects, and the remainder in academic studies. Two credits a year will be given for the completion of the agricultural work.

Beloit Vocational School Completed. The vocational school at Beloit, Wis., has been completed and will be ready for occupancy at the opening of the fall term. The building provides space for two shops, one drawing room, two academic rooms, a library, four commercial rooms, a science room, a cooking room, a sewing room, and an auditorium-gymnasium.

Construct School Furniture at Franklin Shops. Under the direction of Mr. S. A. Martine, director of the vocational department at New Castle, Pa., the boys of the Franklin Trade School have made cabinets, tables, and other furniture to be used in the new administration building and junior high school. The cost of the furniture was less than $3,000, but if purchased in the open market would have cost in the neighborhood of $6,000. The masterpiece of the department is a huge oak table which is to be used by the board of education. The table which is 12 ft. long and 4 ft. wide, will seat fourteen persons.

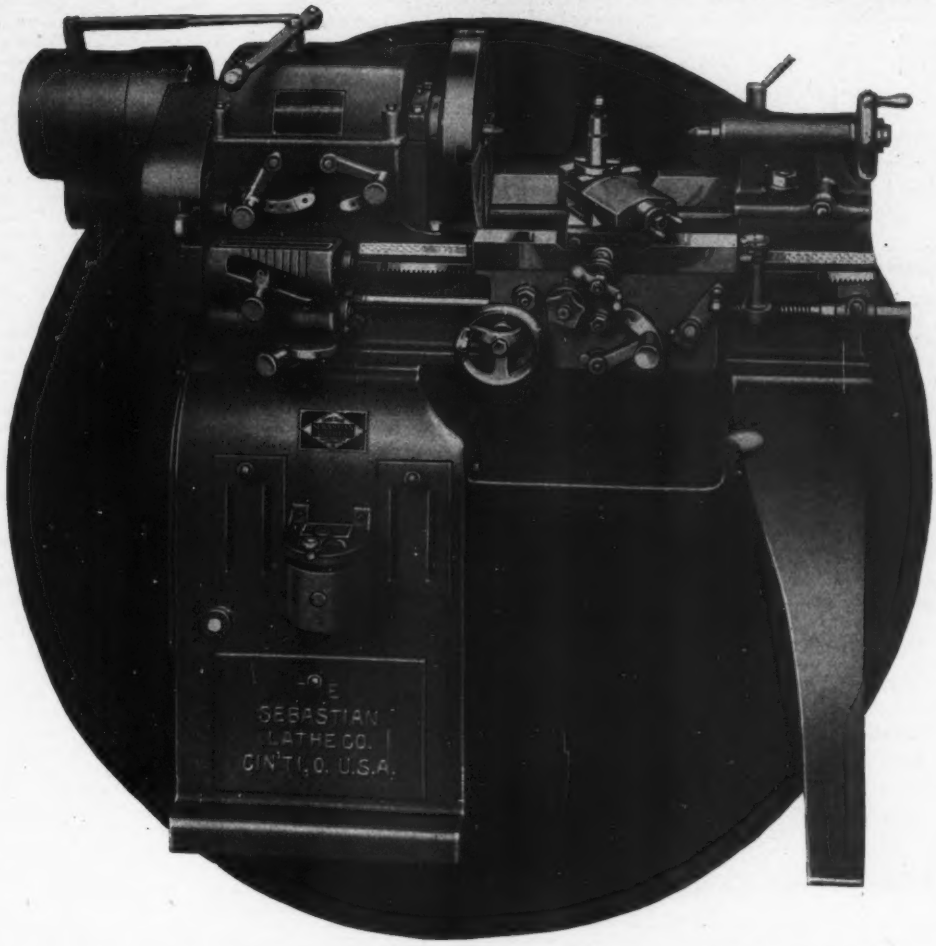
Complete Home-Economics Cottage. A home-economics cottage has recently been completed for the Laredo High School at Laredo, Tex. About 120 girls will be accommodated this year in the new cottage.

To Establish Technical School at Richmond, Va. Plans are being discussed for the establishment of a technical school as a part of the Richmond public-school system. A study has been made of the conditions governing the operation of the school and the character of the industries that would be benefited by the school.

Two Courses Added This Year. New courses in vocational agriculture and home economics have been added to the Schlater School at Schlater, Miss. The two departments will be housed in a modern, two-story building which has been erected for the purpose.

(Continued on page 30a)

IN YOUR NEXT REQUEST FOR BIDS—



Incorporate these Specifications

(....) Lathes Gold Seal or equal—Swing 11″, bed length 4′, to be 8 speed geared head, full quick change box with no loose gears, to cut threads 3-96, feeds .007 to .156, all steel gears, $1\frac{5}{16}$″ hole through spindle, collet capacity $\frac{7}{8}$″, bearings of main spindle $2\frac{3}{16}$x$2\frac{3}{4}$ — $1\frac{5}{16}$x$2\frac{1}{4}$″, to be taper gibbed throughout, motor drive with motor fitted in leg under headstock with a tool cabinet in the leg below the motor compartment, tumbler yoke for cutting left-hand threads with the depth of the teeth already adjusted on the quadrant for throwing over to a left-hand thread, lathe to be bronze bushed wherever required. Macit tool post screw. Silent chain drive with easy adjustment for stretch in the chain, lathe to be fitted with a safety shearing pin, graduated compound rest and tailstock bases, tailstock center oiler, friction type collars on compound rest and cross feed with these collars graduated, accuracy alignment test .0005, motor and control to be (Specify here type current used and type of control wanted). Each lathe to be furnished with a chip pan, depth thread chasing stop, centers, thread chasing dial, steady rest, and wrenches. The lathes shall all be furnished with all gears guarded by cast iron guards, and the operation of the lathe for stop and start shall be through a friction on the headstock controlled by a lever within easy reach of the operator so that the motor can run constantly when machine is in operation. The apron of the lathe shall have a safety device to prevent both longitudinal feeds being thrown in at the same time.

Add here list of extras wanted such as, Chucks, Taper Attachment, Draw-in Attachment, Collets, Tools, Dogs, etc.

The Sebastian Lathe Co., Cincinnati, Ohio

Room 372—50 Church St., New York City

Just Push —

Here are some interesting members of the "Yankee" family of ingenious tools. "Yankee" Tools, you know, are made for good workmen . . . Used by the man—or boy—who values his time and labor and wants to do things in the best short, quick, easy way.

Like the famous "Yankee" Spiral Screw-driver, all of these boring and drilling tools are revolved simply by *pushing*.

"Yankee" No. 41 Automatic Push Drill—
In the hands of carpenters everywhere "Yankee" No. 41 is mate to the "Yankee" Spiral Screw-driver. Pushing on handle revolves the drill. A spring brings handle back for next push. On return movement, drill point revolves backward to clear chips. Length, 11⅜". Eight "Yankee" drill points, 1/16" to 11/64", carried in handle. Price, $2.60.

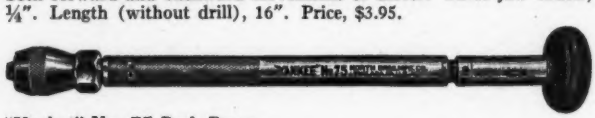
"Yankee" No. 40—
Ratchet movement added, for extra heavy duty. Length, 10¾". Eight drill points in handle. Price, $2.95.

"Yankee" No. 42—
For same duty as No. 41. Made with wood handle. Length, 11⅜". Eight drill points, 1/16" to 11/64", supplied in wood box. Price, $2.05.

"Yankee" No. 43—
For light work only and supplied with only three drill points, 1/16" to 3/32". Length, 10¾". Price, $1.30.

"Yankee" No. 44 Adjustable Tension Push Drill—
Small drills or large, soft wood or hard...You can adjust the spring to give pressure suited to the work. Saves breakage of drill points. Length, 11¼". Eight drill points in magazine handle. Price, $3.15.

"Yankee" No. 50 Reciprocating Drill—
Speedy tool for drilling both wood and metal. Drills continuously on both forward and backward movements of driver. Three-jaw chuck; ¼". Length (without drill), 16". Price, $3.95.



"Yankee" No. 75 Push Brace—
Reaches into tight places, where bit-brace will not work. Drills 3/16" holes in metal; drives ⅜" auger bit in hard woods; ½" to ⅝" bits in white pine. Two-jaw chuck; holds squares up to ½". Length, 16¼" closed. Price, $5.50.

"Yankee" on the tool you buy means the utmost in quality, efficiency and durability

"Yankee" Tool Book, free. Filled with photoviews of how "Yankee" Tools save time and labor.

NORTH BROS. MFG. CO., Philadelphia, U. S. A.

"YANKEE" TOOLS

Make Better Mechanics

(Continued from page 28a)

Recently, tests have proved that graduates of the manual-training schools are better educated in the arts and science than are the graduates from purely classical schools, and they have also proved more ready for profitable employment.

Organize Industrial Schools for Alaskan Youth. In meeting a peculiar situation, the government has established a number of industrial schools within Alaska for the benefit of boys and girls who desire vocational training. Three training centers have been established, one at Eklutna, one at Kanakanak, and one at White Mountain. Kanakanak is the center for vocational training of the Aleuts and for the Eskimos of southwestern Alaska. The school at White Mountain will attract the Eskimos of the northwestern region as far as Point Barrow.

Included in the curriculum of these schools are such industries as house building, carpentry, boat building, furniture making, sled construction, operation and repair of gas engines, marine engineering, navigation, tanning, ivory carving, and basket weaving. The three initial schools have proved so successful that it is proposed to extend the facilities for industrial training as rapidly as the funds permit.

Schools Should Train Girls for Trades. The education of girls and women in the United States for industry must be extended, according to Mrs. Anna L. Burdick, agent for industrial education for girls and women of the Federal Board for Vocational Education. Mrs. Burdick shows that economic pressure or personal desire for employment has resulted in overcrowding commercial classes in the school system, and this has resulted in directing the attention of the public to the need for trade and industrial training of girls and women.

Mrs. Burdick points out that there are now over eight and one-half million wage-earning women in the country and their number is rapidly increasing. The census report shows that one out of every five women is gainfully employed, and that one out of every five wage earners in mechanical and manufacturing industries is a woman.

A Survey of Occupational Activities at St. Louis. The board of education at St. Louis, Mo., has instructed its director of research to make a survey of local occupational activities preliminary to the expansion of the vocational school. The cooperation of local industrial, commercial, and labor organizations has been obtained.

Tenth Annual Smith-Hughes Conference Held. The tenth annual Smith-Hughes conference was held recently at Great Falls, Mont., with sessions covering three days. There were round-table discussions of the different problems confronting Smith-Hughes instructors and national authorities on vocational education. Among those who addressed the meeting were Mr. C. H. Lane of Washington, Mr. William Kerr of Idaho, Mr. I. J. Jensen of the Judith Bason branch station at Moccasin, and Dan Noble, county agent of Fergus county.

Manual-Training Idea Shows Growth in Extent and Influence. Data recently compiled shows that the manual-training idea is growing in spite of opposition on the part of educational nonconformists who insist that training in the classics is more to be desired than practical education leading to a trade.

Vocational Meeting at Berkeley, Calif. The vocational education meeting was held at the University of California, with speakers on education, commerce, and industry in attendance. At the meeting, important problems in the fields of vocational guidance, cooperative trade extension, and part-time education were discussed in a series of evening meetings under the direction of the division of vocational education, in cooperation with the state education department. The general subject of cooperative education was discussed at five meetings, while the subject of part-time education was taken up in four lectures.

Among the educators in attendance were State Supt. William J. Cooper, Nicholas Ricciardi, George C. Mann, J. C. Beswick, Vierling Kersey, and J. G. McGlade.

Aviation Added at Benson School, Portland, Oreg. A course in the mechanics of aviation has been added this fall at the Benson Polytechnic School at Portland, Oreg. For the present, only a limited number of pupils will be admitted, and only the first year of work will be offered.

Texas Asks $312,000 for Vocational Work. State Supt. S. M. N. Marrs of Texas has requested $312,000 each year for the next biennium for vocational education work in the state.

Ask State Aid for Moline Apprentice School. The board of education of East Moline, Ill., has cooperated with the Tri-City Manufacturers' Association in obtaining state aid for the association's apprentice school. Up to the present time, the school has been maintained almost entirely by the association. The school boards of the quad-cities have cooperated in the maintenance and operation of the school.

Two Courses Added at Wausau Vocational School. With the opening of the new school year at Wausau, Wis., two new vocational courses have been introduced in the vocational school. One is electrical work, to be taught by Mr. Allyn Jackman, and the other is foreman training, to be taught by a specialist from Kansas.

Additional Class for Haverhill Trade School. An additional class in automobile repairing has been added to the trade school at Haverhill, Mass. The class has a waiting list of 65 boys and it is expected that a second class will be formed.

(Continued on page 33a)

(Continued from page 30a)

A Course in the Groundwork of Aviation. The George Washington High School at Los Angeles, Calif., is offering a course in aviation. The course has been established in the high school since the shop building is capable of accommodating these classes. Although the school will not instruct in flying, it is desirable to have airports near for visitations. Sufficient equipment for the course has been furnished by the U. S. Naval Air Station at San Diego.

Handwork Produced by Buffalo Students. The evening-school pupils of Buffalo, N. Y., turned out last year, articles of clothing, handwork of various kinds, furniture, and household furnishings to the value of $212,187, according to a statement of the U. S. Bureau of Education.

At an actual cost of $62,483, articles valued at $121,187, were made by the pupils last year. The 6,922 persons enrolled turned out 27,599 articles, comprising clothing, dress accessories, embroidery work, woven goods, basketry, reed work, furniture, and household furnishings. The evening classes specialized in making over old clothing, and hundreds of well-made garments were produced at little cost.

Propose Vocational School at Dallas, Texas. A campaign has been started at Dallas, Texas, for a $200,000 building fund for the proposed vocational school. Tentative plans have been prepared for a building with an administration section, a building-trades section, and a shop-crafts section. The school will be erected on a 30-acre site, which was purchased at a cost of $100,000.

Vocational Board at Racine Requests Building Fund. The vocational school board of Racine, Wis., has included in its budget a request for an appropriation of $40,630 for building purposes. The appropriation is to be used for the erection of a girls' vocational school.

Erect Farm-Shop Building at Ponca, Nebr. The school board at Ponca, Nebr., has started the construction of a farm-shop building. A total of 24 boys are enrolled in the course in farm shopwork.

Propose New Vocational School. The city council of Waukesha, Wis., has appropriated $9,900 toward a site fund for a vocational school, to be erected at a cost of $20,000.

Manual Training Building at Macksburg, Ohio. A new manual training building is under construction at Macksburg, Ohio. The building contains space on the second floor for manual training and painting rooms.

Continuation-School Attendance Counted as High-School Attendance in Computing State Aid in New York. The New York State laws of 1928, which have been amended by the Dick-Rice law, provide that in computing state aid on the minimum state-program basis, pupil attendance at part-time or continuation schools will be counted on the same basis as attendance at high schools. The change is to be made before the $14,000,000 salary-increase program for 1928 is decided, and the change will be anticipated in estimating the financial ability to carry the program through 1929.

Statistical Analysis of Evening School Enrollment at Hamtramck, Mich. Mr. S. R. Biernacki, director of evening schools at Hamtramck, Mich., has issued a statistical report of the evening schools, in which he makes an analysis of the attendance, membership, daily student hours of work, average attendance and enrollment, and per cent of attendance and enrollment for the year 1927-28.

Mr. Biernacki, in his analysis, shows that there was an enrollment of 2,579 students, of which the high school had the largest, with 1,114 students, or 43.4 per cent of the total enrollment. The vocational building was second, with an enrollment of 546 students, or 21 per cent of the total enrollment. In a comparison of the enrollment by departments, it is noted that the foreign English department had the largest enrollment, 753 students, with 29.1 per cent of the total enrollment. The citizenship and industrial-art departments were second, with 545 and 546 students respectively. The domestic-art department had an enrollment of 185 students, or 7.2 per cent of the total enrollment.

In the vocational department, there was a total of 13,916 students in attendance, as compared with 14,966 the previous year. The average membership for the year was 214, and the average attendance was 210 students. The total daily student hours for the year reached 27,832, while the total daily membership amounted to 17,004. The attendance for the year was 81.8 per cent, as compared with 82.1 per cent for the year 1926-27.

In a comparison of the average membership and attendance by subject, it is noted that the highest membership was in the airplane, drawing, and general shop classes, with the classes in machine-shop practice, woodworking, and printing in second place. In the per cent of attendance, it is found that printing, woodworking, machine shop, and automotive mechanics rank first, with drawing, carpentry, and general shopwork in second place. The average class membership was 17.66 per cent and the total average of attendance reached 81.5 per cent.

In a comparison of the enrollment by departments in the high school, for the first semester of 1927-28, it is shown that the industrial and vocational classes had the largest enrollment, which was 32.8 per cent; the citizenship and foreign English classes ranked second, with

(Continued on page 38a)

free this Genuine Irwin Dowel Bit!

So many industrial arts instructors have suggested that we furnish a short bit for the use of younger students, that we have decided to give every authorized industrial arts instructor an opportunity to use an Irwin Dowel Bit 61T, entirely without obligation.

Length — 4½" over all. Cutting Head — Smoothbor (see drawing) has these features: (1) Screw with fine pitch of thread for extra smooth boring. (2) Spurs of length in keeping with pitch of screw. (3) Cutters designed for cutting smooth, thin chips. (4) Throat opened for easy flow of chips. **Shank** —Tapered square to fit standard brace chuck. **Finish**—Polished.

Send for your bit now. Let the boys use it constantly and see how well they like it. See how much easier it works in crowded aisleways — and note, too, the absence of bent bit troubles so common in longer bits.

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Mail the coupon today. It places you under no obligation whatever.

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I am a manual training instructor in..... School. Please send me a genuine Irwin Dowel Bit 61T entirely free of charge.

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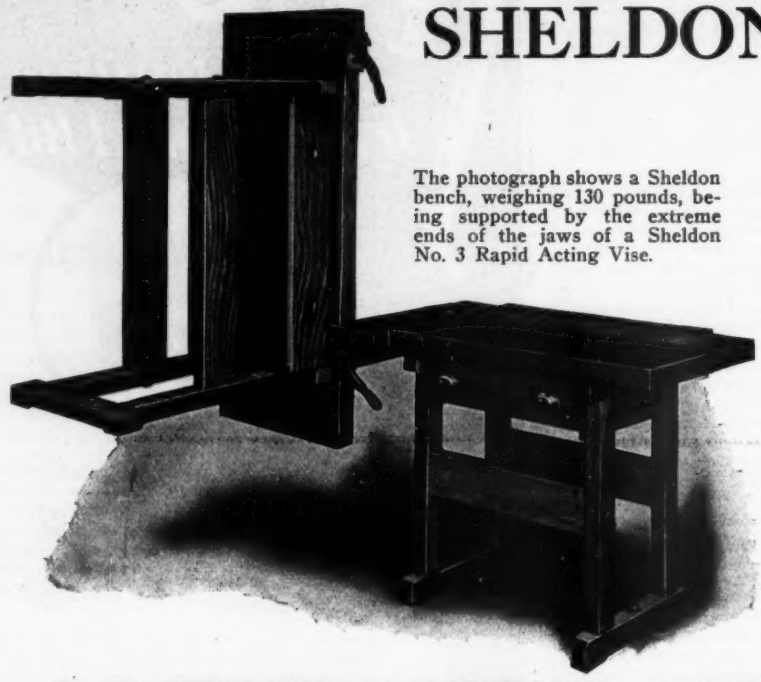
SHELDON VISES ARE SHELDON MADE



The photograph shows a Sheldon bench, weighing 130 pounds, being supported by the extreme ends of the jaws of a Sheldon No. 3 Rapid Acting Vise.

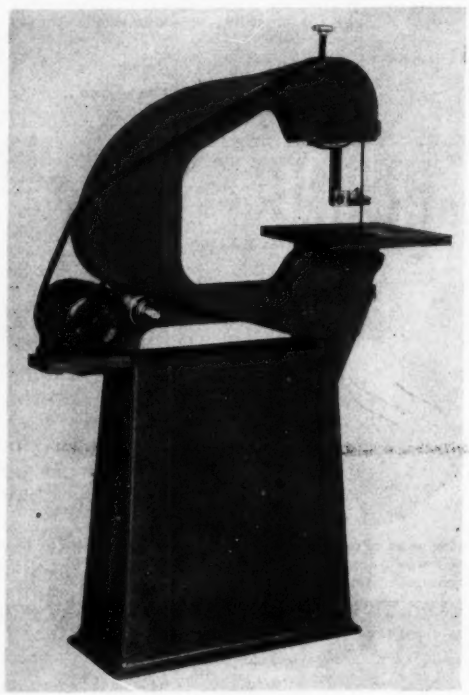
The vises for Sheldon benches are made in our own metal shop which drills, mills, turns and punches over 600 tons of metal parts each year. Sheldon benches may be equipped with our continuous screw, rapid acting or parallel bar rapid acting vise. Sheldon vises are the result of 30 years manufacturing experience, are made for hard service, and are fully guaranteed.

E. H. SHELDON & COMPANY MUSKEGON, MICH.

Vocational Furniture

SCHOOL SHOP EQUIPMENT NEWS

For the Supervisor and Teacher who desires to keep abreast with news of new Machinery, Tools, Supplies, etc.



NEW PORTABLE BAND SAW WITH INCREASED CAPACITY

Consistent with its policy of developing machines capable of doing better work, and with greater ease, the DeWalt Products Company, of Leola, Pa., has offered a new portable band saw of enlarged capacity, which should prove of interest to instructors in woodworking shops.

The DeWalt band saw is designed to provide in a portable machine, the power and handling capacity of a production stationary band saw. The machine is mounted in a one-casting housing, with three tracking pulleys and saw blade, and is well guarded for the safety of the operator. A cover hinged onto the casting entirely covers the blade so that it is open only at the cutting point.

The entire machine, including the floor standard and motor, weighs only 210 pounds. Its portable feature does not interfere with its use as a stationary unit, and it has the power and capacity of a production machine.

The machine may be used with individual motor-driven unit, equipped with motor and floor standard. It may also be used independently of the motor and floor standard, since the unit can be mounted on a "wonder-worker" without interfering with any other operation of the machine.

NEW SLIPROLL FORMER FOR SHEET-METAL WORK

In keeping with its policy to present the latest in equipment for

(Continued on page 37a)

(Continued from page 34a)

the sheet-metal worker, the Niagara Machine & Tool Works at Buffalo, N. Y., has placed on the market a new sliproll former for use in sheet-metal shops. The machine is a new design for which a patent has been applied, and represents a radical departure from the old, split-bearing, toproll-lifting type.

The machine has a special gear arrangement which permits the setting of the front rolls sufficiently apart to allow the folded edges of the sheets to pass through. After completing the forming operation, a trigger release is pulled, allowing the toproll to swing forward. The trigger release and the knurled-roll handle are on the same end of the machine, adjacent to each other, permitting the two operations to be performed almost simultaneously.

The special features of the machine are the heavy base of the box section, insuring the permanent alignment of rolls, bearings, and housings, and eliminating the lighter tie-rod construction. A full-bearing sleeve is provided on the movable end of the front roll, which is held in position by the trigger mechanism. The mechanism which requires only the touch of a finger for release, positively locks the upper roll when it is returned to the operating position. In removing the work, the bearing sleeve remains in place on the roll, thus protecting the bearing surface from dirt and grit. The gears are of machine-cut steel, insuring quiet, smooth operation. They are completely inclosed, a feature which insures safety and eliminates the possibility of any foreign substance entering between the gear teeth.

The machine will handle No. 22 gauge metal and is available in three sizes.

Complete descriptive information and prices of the new sliproll former may be obtained by writing to the Niagara Machine & Tool Works, 637 Northland Avenue, Buffalo, N. Y.

NEW CATALOG OF MACHINE BITS AND PRECISION TOOLS

The Russell Jennings Mfg. Company of Chester, Conn., has issued a 61-page catalog, illustrating and describing the Jennings extension-lip auger bits, including auger, car, dowel, machine, and plug bits, and precision tools, including screw-driver bits, screw drivers, and Scotch pattern bits.

A copy of the catalog will be sent to any shop instructor, or school official, who will write to the Russell Jennings Mfg. Company at Chester, Conn.

DRAFTING INSTRUMENTS FOR SCHOOLS

"The Use and Care of Drawing Instruments" is the title of a revised booklet recently issued by the Eugene Dietzgen Company of Chicago, Ill. In its revised form, the booklet shows some additional features not included in the earlier issue. It describes the instruments used in ordinary drafting and gives some instructions for their use and care. A section is given to practical exercises in the use of the instruments, particularly in geometrical, architectural, and mechanical drawing.

The firm has also issued a small pamphlet entitled, "Drawing Instruments and Materials for Schools and Colleges," which is a supplement to the general catalog. It lists and describes all the standard lines of drawing instruments, including the "Gem Union," the "Excello," the "Champion," the "Federal," the "Universal," the "Reliance," the "Dependo," the "Scholar," the "Prep," and many others.

The Dietzgen Company has had forty years' experience in fine instrument making and their products have attained a high place in fine drafting work because of their perfection in design, material, temper, balance, workmanship, and finish. With extensive manufacturing facilities and a variety of products, the firm is able to supply all requirements in both quality and price.

Complete information and prices of the Dietzgen instruments may be obtained by writing to the Eugene Dietzgen Company at 166 West Monroe Street, Chicago, Ill.

NIAGARA COMPANY OPENS NEW YORK OFFICE

The Niagara Machine & Tool Works has announced the opening of a New York office at 50 Church Street. Mr. H. D. Rosenkrans is in charge as manager of the New York district.

New Prest-o-Weld Welding Outfits. The Oxweld Acetylene Co., of New York City, has announced the marketing of three new Prest-o-Weld welding outfits for use in automobile repair and sheet-metal shops. The outfits are designated as auto-repair, general-purpose, and welding outfits and have been made possible by the addition of two small, two-gauge regulators, and two special blowpipe tips, one for heating and brazing, and one for radiator soldering.

Type W-102-A, which is a general purpose outfit, is intended for use in all repair shops where the oxy-acetylene process is employed in its various forms—welding, heating, soldering, brazing, lead burning, and radiator repair. Complete equipment is provided for the use of this general-purpose outfit.

Information concerning these welding outfits may be obtained by writing to the Oxweld Acetylene Co., at 30 East 42nd St., New York City.

(Continued on page 38a)

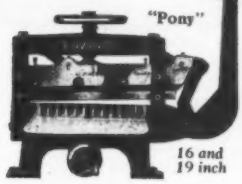
THE "E-Z" CUTTER

Leader for over 30 years

Knife has the powerful "Shear" or Dip Cut

Note Natural Position of Lever, Knife Down

"Pony"



16 and 19 inch

Advance Cutters

Advance Lever Paper Cutters are made in four sizes, from the 16- and 19-inch "Pony," with or without iron stand, to the sturdy 26½- and 30½-inch sizes illustrated above.

Send today for full information regarding Advance Cutters and ask for literature describing any of the following machines and utilities used throughout the world in the Graphic Arts:

Diamond Power Paper Cutters
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Challenge Mammoth Iron Furniture
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See our SPECIFICATIONS in BRUCE'S SPECIFICATION ANNUAL INDUSTRIAL ARTS & VOCATIONAL EDUCATION EDITION

The Challenge Machinery Co.
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Six Students-
Six Drawers

Every student enjoys having his private drawer for his own belongings—here it is, in this very popular No. 225 Kewaunee Mechanical Drawing Table. Each drawer with individual key; also master-key. Compartment is shown on left side where drawing boards are stored.

This desk is used in many high schools, where it has won a well-deserved popularity. It is a good seller and it always satisfies.

We are manufacturers of a very complete line of Art and Mechanical Drawing Tables. Write for our complete Book of Illustrations.

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LABORATORY FURNITURE EXPERTS
Adrian Factory
C. G. CAMPBELL, Pres. and Gen. Mgr.

Designers and Manufacturers of Art and Mechanical Drawing Room Furniture for Schools and Colleges.

Adrian, Mich.

Instructor's Table No. 300
One of the very best and most satisfactory. Large working surface on top and adequate storage space below.

Kewaunee

(Continued from page 37a)

NEW THURSTON MANUAL-TRAINING CATALOG

The Thurston Manual Training Supply Company of Anoka, Minn., has issued its fourteenth annual catalog of "hard-to-get" materials for the school year 1928-29. The catalog contains 64 pages devoted to such articles as upholstery materials and supplies, lamp shades, porcelain table tops, electrical equipment, picture molding, decalcomania transfers, inlays and carving moldings, cedar-chest supplies, wheels for toys, hardware, wood finishes, furniture mountings, and hardware, art fiber supplies, tea-wagon wheels, and wire lamp frames.

The wide range of products and materials handled by this firm makes it possible for manual-training instructors to obtain materials and supplies through a single source. This is unquestionably a service of great value to shop instructors and one that should prove of convenience and accessibility to all those interested in manual-training equipment and supplies.

MR. K. W. ATKINS APPOINTED TO MEMPHIS BRANCH OF ATKINS COMPANY

Mr. K. W. Atkins, vice-president of E. C. Atkins & Company, has been appointed to the sales managership of the Atkins branch house at Memphis, Tenn., to succeed Mr. B. M. Gladding.

At Memphis, the Atkins Company maintains a large force of salesmen who call on the saw and planing mills, and the manufacturing and hardware trade.

Mr. Atkins is well fitted for the position, having filled such important positions as field manager and head of the mill saw department. He has also traveled extensively for the company all over the country, and has been in close contact with Atkins' sales representatives and customers.

PAASCHE AIRPAINTING EQUIPMENT

The Paasche Airbrush Company of Chicago, Ill., has issued a new catalog of airpainting. The booklet contains fifteen pages devoted to descriptions and illustrations of effects produced with the convertible, standard, universal, and multiplehead Paasche airbrushes. The catalog lists pressure-feed airbrushes, portable airpainting units, gasoline-engine airpainting units, one-hose airpainting units, and airfinishing booths.

Complete information and prices may be obtained by writing to the Paasche Airbrush Company at 1909 Diversey Parkway, Chicago, Ill.

SHEET-METAL-WORKING MACHINES AND TOOLS

The Niagara Machine & Tool Works of Buffalo, N. Y., has issued a small catalog of 23 pages, which is devoted to descriptions and illustrations of sheet-metal-working machines and tools. The catalog lists sheet-iron folders, adjustable pipe folders, combination bench machines, crimpers and beaders, groovers, forming rolls, tinner's stakes, mandrels, tinner's snips and shears, rivet sets and beaders, hand grooving tools, foot squaring shears, and circle shears.

Complete information and prices of these machines and tools may be obtained by writing to the Niagara Machine & Tool Works at 637 Northland Ave., Buffalo, N. Y.

NEWS NOTES

(Continued from page 33a)

30.7 per cent; the commercial classes were third, with 17.7 per cent; the academic classes were fourth, with 11.3 per cent; and the home-making classes were fifth, with 7.5 per cent. There was a grand total attendance of 22,512 for the semester, of which 12,732 was the attendance of men, and 9,780 was the attendance of women students. The average attendance for men students was 291 and the average for women students was 270. The total per cent of attendance for the semester reached 80.3 and the total number of class meetings was 1,020.

The enrollment in the evening schools for the year was, no doubt, the largest in the country, if the enrollment in proportion to the population of a city is given consideration. The courses are planned with care to satisfy the needs of both the foreign-born and the native-born adult, who has had no chance and wishes to better himself, and the fine attendance is in fact due to the "satisfied customers" who crave more knowledge and who come to the evening school to get it.

Vocations Taught in Reform Schools. Seventy-five per cent of the industrial schools for delinquents in the United States teach trades and occupations to the inmates of these institutions, according to a recent report of the U. S. Bureau of Education. Only .5 per cent of those discharged from these institutions were reported as illiterate.

A total of 158 institutions report 84,317 inmates, of which 65,174 are boys, and 19,143 are girls. There was a total of 1,488 instructors employed, of which 582 were men, and 906 were women. In addition to the regular teachers, there were 4,677 assistants, of whom 2,529 were men, and 2,148 were women.

The institutions reporting gave instruction to 61,740 inmates, or 74 per cent of the total number of inmates of the institutions; trades or occupations were taught to 48,646 inmates, or 75 per cent of all those confined in these institutions.

(Continued on page 40a)

Are your courses keeping pace with the changing times?

MODERN TEACHING MAKES PROVISION FOR THAT GREAT MASS OF STUDENTS WHO WILL NOT GO TO COLLEGE.

Therefore you are enriching your curriculum with subjects of benefit to your students the day they leave school.

Consider these three new Vocational textbooks—they will help you realize your goal.

Applied Mathematics
Graded for the Vocational and Junior High School. Useful to the largest group of your students.

GENERAL SHOP MATHEMATICS

By HERBERT DRUERY HARPER, *Teacher of Trade Mathematics, Murray Hill Vocational School, New York City*

HERE is a textbook which will directly aid your students in adapting themselves to the workaday world they will all face, and at the same time teaches them the fundamental mathematical concepts. It is graded for the Vocational and the Junior High School students, particularly those interested in Industrial Arts.

The material is organized to deal with such subjects as: The Fundamentals of Arithmetic as Applied to Shop Work; Percentages, as required by the Average Workman or small Business Man; Ratio and Proportion, relative to Problems about the speed of Pulleys and Gears; Practical Measurements, containing all the geometry necessary in performing operations involving areas; Formulas, their Valuation and Change; Powers and Roots; Working Drawings, explaining orthographic projection as related to various types of objects, including stock lists for a great many objects built in the average Vocational and Junior High School Shop.

General Shop Mathematics has been designed to make every problem real to the student, applicable to business or industry, and avoids entirely the abstract problems. Here is a course designed to adapt itself actually to the particular needs of the student whose education will cease with Secondary School.

148 Pages 41 Blue Prints $1.50

AUTOMOBILE SHOP MATHEMATICS

By HERBERT DRUERY HARPER, *Instructor of Trade Mathematics, Murray Hill Vocational School, New York City*

THIS book, the first of its kind to be published, definitely correlates mathematical instruction with shop activity. Thus mathematics becomes a unit of purposeful experience to the pupil whose vocational intelligence is enlarged by contacts with information relating to his trade.

For the many schools now operating on the Dalton plan, and similar methods where the student has the responsibility of his own progress, Automobile Shop Mathematics is particularly qualified, in the lucid and detailed treatment of its various topics.

The subject is treated under the following heads: Speeds; Gear Ratios; Miles per Hour; Measuring Instruments; Screw Threads and Screw Thread Cutting; Electrical Units Related to the Automobile; Horse-Power and Efficiency of Gas Engines; Brakes; Gases; Springs; Gears; Reference Tables.

Here is a textbook of Mathematics for machine shop work, written to meet the needs of the ever-increasing specialization among wage earners. Its specific application is to the class in automobile repair and construction.

About 142 Pages 60 Illustrations
To be published October 20

Elementary Principles of Radio
Teaching necessary Physics Without using Higher Mathematics.

RADIO

A Study of First Principles
By ELMER E. BURNS, *Instructor in Physics, Austin High School, Chicago*

GIVING a simple and clear explanation of Radio, this is the only textbook covering the elementary principles of the subject for High School use. It is not mathematical, using only simple arithmetic and algebra to explain the fundamentals of radio broadcasting and reception.

The subject of resonance, the meaning of static and dynamic characteristics of a vacuum tube, effects of capacity and inductance, impedance of radio circuits, reasons why the same coil has greater resistance for currents of high frequency than low frequency, methods of making radio frequency tests of coils and condensers, hysteresis in transformer cores, power factor of radio circuits, and amplification factors are some of the topics discussed.

It is the only book which explains the dynamic characteristics of a vacuum tube in non-mathematical terms.

An examination of this text will convince you, as it has convinced the many teachers who have examined and adopted it, that it is a simple, clear, and adequate exposition of present radio theory and practice.

290 Pages 225 Illustrations $2.00

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Weber Cosmos Set Number 3873 is incomparable when stacked up against ordinary school drawing instruments.

So many features you would never expect in school instruments . . . so many features of really professional value to encourage your students in achieving the habit of accuracy.

The round system, of course! Head construction of large dividers and compasses equipped with straightening device. Improved bow instruments and ruling pen.

It is well worth your while to personally inspect a set of these advanced school drawing instruments.

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WEBER

Drawing Instruments & Materials

(Continued from page 38a)

A total of 91 schools reported 24,110 inmates committed, of which 2,271 could neither read nor write, or 9.4 per cent illiterate.

Hold First Course in Model Airplane Construction. Twenty-six vocational instructors, boy-scout leaders, and boys' secretaries attended the first course in airplane model construction, held in Detroit, Mich., during the latter part of August. The course was given free by the American Boy Magazine, sponsor of the Airplane Model League of America. The league, in its one year of existence, has enrolled nearly 200,000 members and enlisted the aid of hundreds of manual-training teachers.

The work was given at the Jefferson Intermediate School in Detroit, and was in charge of Mr. Merrill Hamburg, airplane-model expert. During the course, which covered the period from August 27 to September 1, morning and evening classes were conducted, with lectures and work at the benches. The course covered not only actual model building and flying, but also the theory of aeronautics, the means of organizing airplane-model clubs and promoting interest, the holding of contests, and other phases of the work. A certificate was awarded to each person who completed the course.

It is planned to hold a similar, though more extended, course next summer.

Vocationalizing the High-School Commercial Course at Wilmington, Del. The commercial department in the Wilmington High School at Wilmington, Del., had been offering a regular four-year commercial course prior to 1926. The instruction was general, since the purpose was to prepare pupils for commercial occupations.

Following a study of business requirements in the community, it was decided to install a new commercial course of two years, in place of the four-year course, and to require specialization in one of the three major units. While the last two years are given up to strictly commercial subjects, only the senior year is arranged for the cooperative plan. The cooperative year is also a twelve months' term, instead of the usual nine months.

In order to make the cooperative part-time work successful, a coordinator is employed who is responsible for maintaining the proper contact between the school and employment. The head of the commercial department is assigned to this work as part of his regular duties. The guidance and placement bureau cooperates in finding employment and little difficulty is experienced in placing pupils as soon as they are ready for employment.

In the experience of Wilmington, the plan has worked out very successfully. The pupils are better trained, they enter directly into employment, and at graduation, they have had one year of experience in employment under the guidance of the school. The pupils appear to hold their positions well, which is, after all, the real test of the training.

Aviation Course at Sacramento, Calif. An aviation course was introduced this fall at the Sacramento High School. Mr. Charles Lipps, an expert in the mechanics of aviation, has been secured as instructor for this course. Other courses of a similar nature are advanced engineering covering the building and remodeling of machines; mechanics, involving the nature and care of the engine; and navigation, covering the instruments used in mapping out the courses of airplanes.

Emphasize Metal Work in Cleveland Shop Classes. Due to the fact that metal is replacing wood in homes and commercial buildings, and that articles formerly made of wood are frequently made of metal, the department of vocational education of Cleveland, Ohio, has emphasized metal work in the junior high schools.

During the present school year, a course in foundry practice has been added so that students may learn about the art of casting.

In all the work, it is not the purpose to train junior-high-school students as expert metal workers, but to endeavor to familiarize them with practices in the trade.

The vocational work in the Cleveland schools is in charge of Mr. Howard L. Briggs.

Will Open Jewelry Apprentice Class in New York City. As a step toward providing instruction for jewelry apprentices in the day and evening classes of New York City, the board of education has been asked to accept a donation of equipment valued at $5,000 by the Jewelry Crafts Association for use in connection with the proposed apprenticeship classes in jewelry design in the evening trade and day continuation schools.

The plan contemplates operating the day school between the hours of eight and five, five days a week, and the evening school for the usual number of hours. Both schools will work in conjunction with each other, using the same classrooms and equipment.

Basketry Taught in New York Vacation Schools. Under the supervision of a special teacher, the basketry groups at the vacation school No. 151, Brooklyn, New York, completed some very fine work. Combination baskets of rope and raffia were quickly made and their practical use was stressed so that they may be used by the children. The best baskets were exhibited in Manhattan at the close of the season.

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(Continued from page 40a)

Plan Central Metal Trades School for New York City. The board of superintendents of New York City has asked the board of education to make provision in its new budget for the establishment of a central continuation school for the metal trades in a central building in Manhattan or Brooklyn. The new metal-trades school is intended to meet the growing demand for vocational training in the city's schools. A survey of the continuation schools, made by Associate Superintendent Gustave Straubenmuller showed that there were over 4,200 pupils desirous of studying for the metal trades. The school would accommodate approximately ten classes and would transfer 1,300 students for intensive training.

Aside from the items of equipment and alterations, it is estimated that the cost of establishing the school would be comparatively slight, as the teachers assigned to the school would be transferred from other continuation schools.

Propose Change in New York Eligibility Rules. Amendments to the eligibility requirements for high-school licenses and for licenses to teach pottery in the elementary schools of New York City are planned by the board of superintendents. The change in the regulations for the teacher of pottery would waive the requirement of five years' journeyman trade experience in order that candidates lacking in the requisite, but who appear to be qualified in other respects to teach the subject, may be permitted to take the examination. In order to be eligible for the license, such a teacher must show high-school graduation, or its equivalent, and experience or training in the subject.

New York City Trade School Fits for Industry. Miss Florence M. Marshall, principal of the Manhattan Trade School for Girls, New York City, at a recent conference of educators at Oswego, described how the city's only trade school for girls prepares its students for industry, and pointed out that the school is unable to take all of the girls who apply. Miss Marshall, in her talk, emphasized particularly the need for training girls in a large city like New York for entering industry where there is a future, thus making them into economic and social assets.

The Manhattan Trade School was opened in 1902 by a group of women, and was operated as a private school for training women in vocations. After eight years, it was taken over by the city and conducted under city management. In 1918, the school moved into a new building built especially for the purpose.

Miss Marshall pointed to the need for day trade schools and called attention to the fact that the school cannot take all the applicants who apply for admission. The school aims not only to train for skill in the vocation, but to create for the girls an atmosphere of the highest type in which character, general ability, good health, and a discriminating sense of the higher values in life are developed to the greatest extent.

Propose Expansion of Printing Department. The school board of Boise, Idaho, has proposed the expansion of the printing department of the high school to meet the community demand for apprentice printers, and to effect a substantial saving in the school printing bills. There is a steadily growing demand for printing apprentices due to the rapid growth of the printing industry all over the country. There appears to be a scarcity of good apprentices. The school board feels that there is need for the development of new material, younger blood along modern printing lines, and also that the subject of printing should be encouraged in the institutions of learning. Apprentices are needed at the present time to start in the business and to develop into machine operators, make-up men, or men trained in the art of commercial printing.

Carnegie Offers Four-Year Course in Printing. The Carnegie Institute of Technology of Pittsburgh, Pa., is offering a four-year training course for superintendents of printing plants in order to meet the demand for competent men in these positions. The plan has been arranged and carried out with the cooperation and hearty support of the master printers' association.

The plan also has as its purpose the training of competent instructors to fill the position of printing instructor in schools and educational institutions where printing is being taught. Students graduated from the four-year course, with a diploma in printing, are assured of good positions in trade, continuation, or high schools, at very attractive salaries.

Four Schools Add Agricultural Courses. Four new schools for the teaching of vocational agriculture have been established in Faulkner county, Ark., making a total of twelve for the county. The new courses will be taught at Hooland, Mayflower, Enola, and Liberty schools.

Continuation-School Classes for Employment. The New York City board of education has authorized the opening of continuation-school classes in connection with the employment office of the Young Women's Hebrew Association in Harlem. Instruction in vocations is offered to girls who are beyond school age and who are inadequately prepared for work, but who are waiting for positions. Similar classes for clerical workers were conducted at the association in 1921 and also in 1914.